K. UMANSKY

Everyday Neuropathology

MIR PUBLISHERS · MOSCOW ·

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К. Уманский

НЕВРОПАТОЛОГИЯ ДЛЯ ВСЕХ

ИЗДАТЕЛЬСТВО «ЗНАНИЕ»
МОСКВА

K. UMANSKY

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Neuropathology

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TO THE READER

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Preface

This book is not a manual on nervous disorders and not a universal reference book for every emergency. It tells its readers about neuropathology—one of the main branches of medicine, that is very closely connected with all the other spheres of medical knowledge.

Once a doctor, always a doctor, whatever he does. The more so when he writes about the work he loves. Being a doctor means loving people and always trying to help them to analyse the state of their health, how they feel, and their illnesses. And, finally, it means giving advice on how to improve their own health and alleviate the suffering of their loved ones. This is the real purpose of this book.

The author of this book, Professor K.G. Umansky, is an Honoured Scientist, and an excellent doctor and researcher who has investigated several aspects of the diagnosis and treatment of nervous diseases. The author discusses various problems connected with such diseases from the standpoint of present-day knowledge. But he also acquaints the reader with many things that medicine has accumulated during its long history, including certain simple remedies that have been unjustly forgotten.

Naturally, it is impossible to cover all the problems of neuropathology in such a small volume. Only those disorders are discussed that are most frequently encountered in medical practice. In language easily understood by people of various professions and different levels of education, the author discusses the main diseases of the nervous system, their causes and treatment, and the preventive measures against them.

There is a great demand for such a book. Not only those who suffer from disorders of the nervous system, but everyone who comes in contact with such patients, wants to understand the main problems in this sphere of medicine. I, personally, know of no other popular science book on neuropathology, published in the Soviet Union or abroad, that encompasses such a wide variety of subjects. I am sure that the reader will find it very interesting.

L.O.Badalyan,
Corresponding Member of the
USSR Academy of Medical Sciences.

I Am a Neuropathologist

One of the distinctive features of today's world is that people of various ages, levels of education, and professions crave for all kinds of knowledge. The wide circulation of popular science books and the variety of subjects that they deal with provide ample evidence of this phenomenon.

I notice this in my daily work. I see that it is not enough for today's patient just to get a prescription. He or she wants to have some idea of the mechanisms of the ailment, its causes and consequences. As a doctor I welcome this attitude: a well-informed patient should help us in our joint fight against the disease.

I am a neuropathologist. Of all the medical professions, I consider mine the most interesting for several reasons. First of all, it is involved in all the theoretical and practical aspects of public health. But this is not all. Neuropathology has a great number of links with non-medical fields of science dealing with problems of a general biological, physico-chemical, cosmic, social, and philosophical character. As for medicine itself, there is not one specialization that can do without neuropathology. Furthermore, in every branch of medicine there is a number of diseases that are directly related to my professional field. Today, in addition to traditional neurosurgery, one can quite definitely speak of such branches as stomatoneurology, neuro-ophthalmology, neuroendocrinology, neurotraumatology, neuronephrology, and even neuroproctology. Strictly speaking, there is not a single organ, which when its function is impaired, does not evoke various changes in some part of the nervous system.

Thus, neuropathology is not only a conglomeration of human knowledge accumulated over the centuries. It is also a mobile system of very complicated interrelations. Neuropathology, like every other science, has its own history, which evidently spans the conscious history of mankind. All the living organisms of our world, especially the more highly organized ones, have worked out simple, but very effective, measures for curing many ailments. Look at domestic and wild animals: when they get sick they turn to mother nature for help. They find herbs and plants, shoots, roots, and fruit that have a curative effect.

Evidently, from their earliest days, humans also employed the same means and methods, perfecting these methods as they developed. This, as is generally known, was the source of folk medicine that afterwards laid the foundation for scientific medicine. Healing, as we understand it today, also developed many thousands of years before our era. This is evidenced by the skulls of prehistoric men, unearthed by archeologists, which had accurately drilled holes in them, i.e. traces of neurosurgical operations. This is perhaps the first reliable evidence of attempts to treat the affected nervous system in prehistoric times. These attempts were definitely successful, because the character of the formed bony defect shows that the operated persons survived.

For a long, long time medicine remained an undivided whole, not splitting into separate branches. But even this non-differentiated medicine had over millennia accumulated knowledge about many diseases of the nervous system, such as headaches, stroke, epilepsy, various paralyses and pain syndromes. The great physicians of antiquity—Hippocrates, Avicenna, Galen, Paracelsus, and others—drawing on experience and their own very precise observations, treated a number of such disorders quite effectively. Some of the treatments that they developed are still used today.

Neuropathology as a branch of medical science originated from anatomical, physiological and pathophysiological research, i.e. it was founded on the study of certain functions of the body and on their relation in the normal state and in pathology.

A considerable amount of information in the fields of neuropathology, psychiatry and psychology had been accumulated by the 17th and 18th centuries. This knowledge, in its turn, greatly influenced the development of metaphysical materialistic natural philosophy. The purely materialistic views of the English philosopher Francis Bacon, who opposed scholasticism and held that medicine should develop on the basis of experimental research, are believed to be of the greatest importance during this period.

Anatomical and physiological clinical research promoted intensive accumulation of new data on all sorts of pathologies of the nervous system. The English anatomist and physician Thomas Willis studied the relationship between the symptoms of the affected function, as seen in the clinical picture, and the localization of the lesion in the nervous system established on the basis of anatomical investigation. Recognition of the necessity of postmortem examinations for establishing the causes of disease and death played an important role.

The achievements of neurology at that time were not an isolated phenomenon. They were made possible by the rapid development of the natural sciences as a whole in the 17th century. This occurred simultaneously with the increase in productivity, and advances in mechanics, optics, astronomy and chemistry. And although progress in medicine was very modest, it was exactly during this period that the basis for neurological research that utilized the achievements in all fields of science was established.

In the 18th century, the foundations of physiology, of the doctrine of nervism and of the theory concerning the role of the nervous system in vital activity and in the development of various diseases were laid. The philosophical and materialistic views of D. Diderot, J. Lamettrie and other great minds were closely interwoven with the views of progressive-minded physicians of the period and contributed to the concept of the nervous system and its functional role. In the 18th century a physiological school arose in medicine that was best represented by the theories of the French physician Broussais. In Russia, at the end of the 18th and the beginning of the 19th century, a clinical school run by the general practitioners E.O. Mukhin and I.E. Diadkovsky established the leading role of the nervous system in the development of many diseases.

Neurology developed into a separate discipline at the junction of many scientific trends that investigated various aspects of medicine and general biology. By the middle of the 19th century a large number of observations of different diseases had been accumulated. Among them, lesions of the nervous system were distinguished. These clinical observations were considered and interpreted in light of the latest findings of the period which had been obtained in microscopic studies of different parts of the nervous system in the normal state and in pathological states. The results of the first precise electrophysiological techniques, as well as of surgery, were also studied. The effects of a number of pharmacological drugs were analyzed. Biochemical processes in the nervous system were investigated. And the evidence obtained in experiments on animals was more thoroughly utilized.

This accumulation of knowledge led to the elaboration of criteria for the topical diagnosis of diseases of the nervous system. This diagnosis was based on the detection of lesion foci by analysis of the impairment of organ functions. It is exactly these criteria, subsequently improved, that neuropathologists use today to determine the exact localization of a lesion in any part of the nervous system.

Topical diagnosis, together with other clinical evidence, became the basis for the development of semeiology, i.e. the science of the symptoms of a disease. The rapid accumulation of knowledge made it possible to distinguish a number of clinical forms of diseases of the nervous system, and even, in some cases, to proceed to aetiological, i.e. causal, diagnosis. All this was reflected in the development of treatments, in the preferential application of pathogenetic (directed at various mechanisms that take part in the pathological process) and aetiological (causal) principles of therapy.

The rapid development of the science of the nervous system finally led to the evolution of neuropathology as a separate medical discipline. This happened almost simultaneously both in Europe and Russia; however, in Russia, neuropathology had developed as an independent trend earlier than in other countries. In 1869, Aleksei Yakovlevich Kozhevnikov (1836-1902), the founder of the Russian school of neuropathology began to read a special course of lectures on nervous and mental diseases at the newly organized department of neuropathology at the Moscow University. In France, the first department of neuropathology was organized at the Paris University 13 years later, in 1882. It was headed by the famous neuropathologist Charcot. Russian scientists have made an invaluable contribution to the development of neuropathology throughout the world. It is sufficient to mention the names of I.M. Sechenov, I.P. Pavlov, N.I. Vvedensky, A.A. Ukhtomsky, and V.M. Bekhterev.

Today neuropathology has reached a new qualitative level. Having become a separate medical discipline in the last century, it not only intensifies research in each of the projected trends, but also penetrates into every sphere of medical knowledge without exception. This is an inevitable process, because it is the nervous system that primarily binds all the functions of the body to form an integral whole. When the nervous system suffers, the whole organism suffers. At the same time, any other disease inevitably affects the state of the nervous system.

Progress in all branches of medicine, as well as in many other fields of science, has led to the development of new, more effective methods of treatment. Advances in pharmacology and the advent of antibiotics have played a special role in this process. This has been instrumental, to some extent, in bringing about a peculiar paradox: faith in the omnipotence of the 20th century has led us to forget a number of old, simple, and very effective treatments. Today, we are again turning to many of them.

Naturally, the purpose of this book is not to give a course in neurology. I shall only try to present a brief account of how a neuropathologist works and how neurological diseases are diagnosed. Some of the most common diseases of the nervous system and their treatment will be described. I shall also attempt to present a general picture of the nervous system, show how complicated diagnosis is, and describe the special features of treatment. Possibly this will help some readers to gain an understanding about how they feel. This is by no means an insignificant matter both for the patient and the doctor when the latter must establish a diagnosis and choose treatment for a given ailment.

Danger Signals

Headaches

I had not seen the friend who had just rung up for several years. He had returned from a construction project in far-off Siberia. After exchanging news, we agreed to meet. "And I want to ask for your help," he said. "I'm absolutely worn out with headaches."

He had changed, of course: he had lost a bit of weight, had more grey in his hair, swollen eyelids, and bags under his eyes.

"I began to get headaches about two years ago. At first they would strike from time to time. The bags under my eyes appeared almost at the same time, or a bit before. Gradually the headaches became worse. I couldn't sleep well. Quite often I went to bed with a headache and woke up with one. Pills helped at first; then I began to take citramonum and other complex powders and stronger pills, but they had almost no effect. Even if the pain went away, it was not for long. Just before my departure, when I could stand it no longer, I finally went to a doctor. I had all the tests done at that clinic."

He showed me the results of his blood count, examination of the fundus of the eye, X-rays of the skull, and ECG with the interpretation. No pathology was evident. Only the specific weight of his urine was somewhat higher than normal. But on examining him, I again noticed the swollen lids, the bags under the eyes, and the rather dry skin. The skin on the back of his hands was wrinkled and even seemed to be peeling. His blood pressure was within normal values. There were no signs of problem with the nervous system or internal organs.

Again I questioned him in detail about everything that could possibly have some bearing on his headaches, even indirectly: the illnesses he had had, the injuries he had sustained, his life-style and diet, etc. I asked him how much liquid he consumed per day.

"I forgot to tell you that since these bags under my eyes appeared I try to drink as little water as possible so that they don't get even bigger."

Now, that gave me a clue. Together we estimated the daily amount of liquid that he consumed. It was not large: a cup of coffee in the morning, a glass of stewed fruit with his lunch, and a cup of tea in the evening. He also obtained a small amount of liquid in fruit and, of course, in the rest of his food. The total was around a litre. This is about half of the required amount. My advice was brief: drink more water, not less than two litres per day; and no medicines, no special diet.

"Is that all?"

My friend sounded somewhat disappointed with such simple recommendations.

We met again after some time. His eyes looked merry, and there were no bags under them.

"Well, how are you? Do you still have headaches?"

"Everything is fine. I even climb stairs like a mountain goat. I want to thank you. Now I can confess that I had begun to think that I would never get over that illness..."

Indeed, many people often suffer from prolonged headaches. What causes them? Any pain is a warning, a signal of disaster. Just like the crying of a newborn baby, pain is the only means of warning us that something is wrong, whatever it may be.

Headaches vary greatly, both in type and localization: there may be acute pain that literally pierces the head, grips it in a vice; there may be a dull, persistent ache; or the pain may be paroxysmal, spreading over the whole head or localized in different parts of it.

The causes of these pains are even more varied. The head is the most important part of the body. It is in the head that the sense organs are situated that allow us to see and hear, distinguish colours and tastes, sense temperature, discern smells, perceive atmospheric pressure and humidity, and many, many other things. The brain incessantly processes information not only from the environment, but from all the internal organs and tissues. It analyses this information better than the most perfect computer, and instantly corrects the functioning of all the organs. The brain determines the features of our reactions and behaviour. Processes of higher nervous activity—analysis and synthesis—are accomplished in the brain. The brain is the material substrate of thought.

Obviously, this is why nature has placed the brain in ideal conditions: it is protected by the massive bones of the skull and by the cerebrospinal fluid—a unique shock-absorber that cushions any kind of injury, blows and concussions. The whole extremely complex system of the brain and sense organs is constantly provided with nutrition, oxygen, and water. This is accomplished through its circulatory system and is continually controlled by an enormous number of receptors that are situated in every part of the brain and its membranes, in the sense organs, the blood vessels and the surrounding tissues. On the basis of the signals from these receptors there is continuous correction of every process: the organism must first of all provide the brain with all that it needs, and only after that does it provide for the other organs and tissues.

The general characteristics of the brain are as follows. The average volume of the human skull is 1500 cm^3. The brain inside it weighs 1350 g. The "dry weight" of the brain equals 4-5% of its initial weight, which means that over 95% of the brain consists of water. The volume of the surrounding liquid is about 150 cm^3. Thus, the weight of the brain amounts to only 2% of the total body weight. However, in spite of this small volume, the cerebral cortex has a surface area equal to 160 000 mm^2. This is due to the great number of gyri. The thickness of the cerebral cortex, which is a most important cerebral structure that, in essence, makes man the Homo sapiens that he is, is on the average not more than 2.5 mm. This carebral cortex, which has a very complicated structure, contains from 15 to 20 billion nerve cells! And this is only in the cerebral cortex! But within the brain itself there is a large number of structures, such as the subcortical ganglia, the brain stem, the cerebellum, etc., that are supplied with nerve cells almost as densely.

The brain requires a tremendous amount of oxygen: weighing 2% of the total body weight, the brain uses up to 18% of all the oxygen obtained by the body, i.e. much more than all the other organs and tissues.

It has been calculated that the length of the capillaries in 1 mm^3 of the brain is 1400 mm, while their walls have a surface area equal to 500 mm^2. If the capillaries of one human brain could be placed end-to-end in a line, they would be 1120 kilometers long, which is more than the distance from Moscow to the southern parts of the Crimea! There is also an enormous number of other blood vessels of greater diameter in the brain. Not less than 750 cm^3 of blood flows every minute through this cerebral "irrigation system"! And during 24 hours more than one cubic meter of blood passes through it!

As we know, blood flows through the blood vessels. These have a rather complicated structure. Blood vessels have muscles in their walls that can constrict or dilate a vessel. Constriction means that the area supplied by this vessel receives less blood. Each vessel has its own nervous regulation that carries out the commands from centres situated at different levels—from the central nervous system to nervous ganglia in the walls of the vessels themselves. The vessels also have a signalling system, i.e. receptors that inform higher levels of the nervous system about the state of the vessels at any given moment. The functioning of these receptors regulates the blood supply to the brain as a whole and to each of its separate zones.

The receptors that monitor the state of

the blood vessels, the organs, and the tissues vary widely in function. There are pain receptors, tactile (pressure-sensitive) receptors, chemical receptors (sensitive to chemical changes in tissues and the medium), thermal receptors and others. Any kind of pain, headaches included, is connected just with the stimulation of pain receptors.

But we should specify here that the brain itself as well as all of its vessels is insensitive to pain. During brain surgery, only the skin of the head and the brain membranes are anaesthetized. The brain itself needs no anaesthetic. Thus, headaches are caused not by lesions of the brain per se, but by various diseases of its membranes and blood vessels.

The brain has three membranes (meninges): the dura mater, the pia mater, and the arachnoid. The first two are generously supplied with vessels and receptors. The third (the arachnoid) has neither vessels nor receptors and, consequently, cannot act as a direct source of pain. These same three membranes also cover the so-called ventricles of the brain, where there is a gland that produces the cerebrospinal fluid that surrounds all parts of the brain. This fluid circulates continuously and slowly and is absorbed by the venous system. The pressure of the cerebrospinal fluid is relatively constant and equals 60-140 mm of fluid, with the patient lying on one side. In a vertical position, the pressure is higher. The blood pressure in the large arteries, through which blood reaches the brain, is also constant. It is equal about half of the blood pressure measured in the usual manner on the arm.

The cerebrospinal fluid has complicated and varied functions. It acts not only as a hydraulic shock-absorber for the brain, cushioning blows and concussions; it also participates in a number of metabolic processes. It plays a protective role, in particular in cases of infectious diseases, because the immunity function is connected with it. One may ask: If the brain does not hurt, how do physicians recognize diseases of the brain itself? There are quite a number of such diseases: infectious ones, caused by viruses and bacteria; vascular ones; and, finally, tumours. What is the basis for diagnosis in such cases?

We began our discussion by stating that the brain is a very complex organ that receives and analyses information both from the environment and from all the systems and tissues of the body without exception. Instant analysis of these data makes it possible to coordinate not only the functions of organs and tissues, but every human activity, including thought processes and creative work.

Different parts of the brain, even the smallest ones, have strictly specific functions: they control movement, coordinate the position of the body with its movements, analyse visual and audial sensations, coordinate metabolic processes, etc. The blood supply to these areas of the brain is differentiated. If there is a disaster in a certain area of the brain, i.e. the function of a certain group of nerve cells becomes impaired, then at once symptoms will appear that are in strict correspondence with just this lesion. For instance, thrombosis or haemorrhage disturbs the blood supply to an area of the brain that is responsible for the movements of the right hand. The result will be complete or partial paralysis of this hand. If the affected area is somewhat larger, for example, the nearby centre of speech, then speech will be simultaneously impaired. Thus, a neuropathologist, while registering separate pathological changes during examination of a patient, can very precisely determine the site of the lesion by analysing the motor, sense, and other disturbances and their relationship. This subdivision of neuropathology, as was mentioned earlier, is called topical diagnosis. It is the cornerstone of the science—its foundation.

But having answered the question "Where?", we must now answer the next question, "What disturbed the function?" Was there a pathology of the circulation? An infection? A tumour? The answer to the first question is to some extent, a prerequisite for the answer to the second one. If the zone of the functional disturbance of the brain area corresponds to the zone supplied with blood by a certain blood vessel, one can say almost for certain that the process is of vascular origin. If the focus does not correspond to an area supplied with blood by a strictly definite circulatory system, it means that one must consider some other factor, such as an abscess, for instance. At the same time, widespread, often multifocal, brain lesions are more typical of infections. The dynamics of the process is extremely important for the diagnosis. Vascular lesions (such as a stroke, i.e. haemorrhage) are mostly rapid processes, whereas tumour-evoked processes develop slowly, and so on.

Of course, it is not always an easy matter to diagnose a disease. The external features of many diseases look alike, both as to the localization of the lesion and the course of the disease. In such cases, another subdivision of neuropathology helps to determine the nature of the disease. In contrast to topical diagnosis, which is used only in neuropathology, this specialty, which is called differential diagnosis, is used in every sphere of medicine. Having collected all the medical evidence about the patient's health, the heredity profile, and specific information about the development of the disease, and having studied the results of this investigation, the doctor, with the help of differential diagnosis, picks out a specific disease from among many. This diagnosis also helps to get an answer to the most important question: What caused the disease? No disease develops all of a sudden, without any cause. If a stroke occurred, it means that the preconditions for it existed, such as changes in the vascular wall. These may be either of atherosclerotic or congenital origin, such as a formerly silent small aneurysm (an aneurysm is a bulging out of the thin vascular wall that is devoid of muscular fibres and has an insufficient blood supply). For an infection to develop, for instance a viral lesion of the nervous system, it is not enough just for the virus to be present in the body. There must also be a certain individual breakdown of the immune system, caused either by congenital or some external or internal factors.

Having determined the cause of the ailment, the necessary steps not only for successful treatment of the patient, but also for preventing such diseases can be taken.

Thus, every diagnosis is like a detective story. You have to find out where the crime was committed, what the criminal did, and why he succeeded in doing it. In almost every case we also answer another question: Who the criminal was? And although the criminal often penetrates into the body from outside, as in the case of viruses and bacteria, it is not so rare for the patient himself to be the guilty party, because of his ignorant attitude towards his body and his health.

My old friend, about whom I wrote at the beginning of this chapter, also behaved far from irreproachably. After intensive questioning it was revealed that about ten years earlier he had suffered from arachnoiditis, i.e. a localized inflammation of the meninges.

"Why didn't you tell me about this?" I asked him.

"But it was so long ago! You don't mean that there could still be some late effects?"

"Of course, there could be. I am quite sure that in your case this is the reason for your illness. Just remember what advice you were given on leaving the hospital. You were told to avoid overheating and extreme exertion, and to somewhat restrict the amount of salt in your diet. Also you were advised to drink only very small amounts of alcohol, and better yet, not at all. Altogether, there was nothing that called for any special effort or medicinal treatment. Now, let us see how you carried out these recommendations. Two weeks ago you returned from the South. You were tanned and seemed healthier. However... Let us examine the situation. What is a tan? It looks lovely, to be sure, but first of all it is a defense reaction of the organism in response to an environmental factor. And like every defense reaction, it has its limits. Immoderate sunbathing evokes a number of changes in the body and, in many cases, leads to illness. Overheating produces marked changes in the metabolic processes, but the risk is especially high for the immune system. That is why after vacationing in the South, after intensive sunbathing and overheating, people catch colds and get viral respiratory diseases more easily. Their chronic diseases also become exacerbated, and sometimes people suddenly discover that they are prone to various tumours. For a person who has had arachnoiditis, the worst consequences can result from the systematic disturbance of the water and salt regulation in the body due to overheating. For many days you systematically did violence into yourself. Am I not right? Lying in the sun every day, the salt being drained out with the perspiration gathering on your skin—this is a strain even for a healthy person, to say nothing of somebody who has had arachnoiditis."

Unfortunately this was not his only transgression. Once he told me happily that he had started jogging to lose weight. I asked him who had recommended this.

"But it is written everywhere that..."

"It is also written that one must be sure to consult a doctor first!"

Once again I had to remind him of his former illness. What is arachnoiditis? It is a localized inflammation of the meninges. And like every inflammation, it does not pass without leaving some traces. How deep these traces are depends on how pronounced and how widespread the inflammatory process was. It also depends on the area that was affected. Peculiar adhesions develop on the site of the former affection with arachnoiditis: the membranes of the brain in this area get stuck together. One would think that once the inflammation has passed everything is all right again, and the patient has recovered. However, in some cases such adhesions impede the circulation of the cerebrospinal fluid to a certain extent. Its flow becomes irregular, the amount of fluid produced changes somewhat and its absorption becomes impaired. In a healthy person any loads that affect the blood circulation, lymph flow, or the circulation of the cerebrospinal fluid do not cause any marked decompensation. However, in a person with limitations in the circulation of the fluid they can sometimes have quite a serious effect.

Here is an example. Lifting a heavy load increases the pressure of the fluid sharply, but the compensatory abilities are limited. This change of pressure on the meninges causes headaches. The return of the pressure to normal is a difficult process and takes some time: the headaches will also continue all this time. When jogging, the fluid acts as a shock-absorber. After arachnoiditis, this shock-absorber becomes a bit defective, and overexertion also causes headaches.

Now a few remarks about the amount of water that we drink. I have already mentioned that a certain amount of water is needed for the normal saturation of all the organs and for the elimination of waste products, i.e. salts that are not needed for vital activity. The waste products are mainly eliminated via the urine and, to a lesser degree, through the skin. The eliminative capacity of the kidneys is very limited. They can eliminate not more than 30 grammes of salts per litre of urine. But to eliminate these 30 grammes it is necessary to drink no less than one and a half litres of water. If these salts remain in the body, where they cannot be deposited in a dry state, they attract some of the water that the body crucially needs for all its functions. Incidentally, this is the reason why bags appear under the eyes and why the urine may have a greater specific weight, which results from the increased strain on the kidneys. But this is still not the end. If there is oedema in one area of the body, it means that in other areas the amount of water has diminished. A deficiency of water in the skull lowers the fluid pressure and, accordingly, causes headaches and a feeling of heaviness in the head.

Unfortunately, alcohol often has a pernicious effect, even in very small amounts. How does alcohol act? The swallowed portion first burns the oral mucosa, then passes down the gullet, also burning its walls, and flows into the stomach, where it has a far from negligible effect on its walls. After that the alcohol passes into the blood and is carried to every corner of the body. All the organs and blood vessels suffer; some more, some less, but all without exception. Nerve cells and vessels of the brain are especially sensitive to alcohol.

After drinking, the face turns red because of the marked dilatation of the blood vessels of the skin. And it is not only these blood vessels that dilate: the eyes become bloodshot and even the earlobes redden. And what about the cerebral vessels? One can say that they become "drunk": their ability to regulate the blood flow becomes seriously affected and the blood supply to the brain starts losing its rhythm. This is the more so because some "drunken" vessels constrict slightly, whereas others dilate. Sometimes one and the same vessel shows different effects along its length: in some places it constricts, in others, it dilates.

Among nerve cells, the cells of the cerebral cortex, which direct our conscious activity and on which our self-control depends, are the most sensitive to alcohol. The nerve cells of other parts of the brain, e.g. the cerebellum, also suffer. As a result, a drunk person's walk becomes unsteady and his coordination is disturbed. And this is still not all. It has been firmly established that alcohol in any amounts kills at least a few cells of the central nervous system. And even afterwards, when the influence of alcohol has worn off and the body has neutralized its effects with great difficulty and losses (with the liver and kidneys functioning to the limit), the vessels still do not "come round", and some time will pass before they return to normal. But, as you remember, the circulation of cerebrospinal fluid is closely connected with the blood vessels. Its pressure on the meninges completely depends on the state of the latter. This is yet another source of headaches, of a "heavy head". Thus, in the body everything is interrelated, which determines our state of health.

Let us get back to our case under discussion. To have had arachnoiditis does not mean that one will become an invalid. Such a person can be considered healthy within certain "bounds" that are determined by his relationships with various factors. What are these "bounds"?

There are people, for instance, who cannot tolerate certain kinds of food, such as tomatoes, strawberries, or milk. A glass of milk is enough to make some people sick Many people feel sick in planes, others are afraid of heights. These are all natural individual characteristics. There are also people who cannot tolerate alcohol. One should know one's personal aversions and on no account break these taboos.

So, let's return to headaches. It was made clear at the beginning of our discussion that pain is a warning—a signal that not all is well—and by no means an independent disease. This symptom is typical for a number of ailments. Headaches can be caused by overexertion, by a change in weather, by hypertension, stroke, meningitis, and many other conditions.

The wife of a friend rang me up.

"Forgive me for disturbing you, but Lena's headaches have become much worse. I never told you about them, but she has had them for a long time. And lately the attacks have become so awful, almost unbearable. She is going to graduate from college soon and needs to study a lot, but these headaches make it very difficult."

They came to see me the same evening. Lena, however, was cheerful and calm.

"I told you," she said, "that there is nothing to worry about. At this moment I don't have a headache. My head is wonderfully clear today. I don't even feel it. It is horrible even to think of yesterday. I had a splitting headache with an awful pain in the right side of my head. Then I felt sick and vomited, and after that I felt better."

"You don't think that your head feels so wonderfully clear and light today, because you are comparing your present state with yesterday's?"

"You should see her when she has an attack," her mother added. "She looks green and swallows every kind of pill, one after another. She lies for hours with a pillow over her head. Only when it becomes quite unbearable does she feel nauseous and vomit. And then we know that she will feel better at last."

"Tell me how it all began."

It turned out that Lena had complained of headaches even before she was five years old. Her grandmother got very worried at the time, and explained that headaches occurred quite often in the family. She remembered how her own grandmother suffered from them. However, nobody paid much attention then. They hoped that it was just Lena's childish imagination, and that she was only copying her grandmother.

Some years passed. Lena complained of headaches from time to time. When she was in the second grade she had a very severe headache at school that ended with vomiting. She was sent home, where she at once fell asleep and slept for two hours.

Her menses started at quite an early age—when she was eleven—and were regular from the beginning. From then on her headaches became more frequent. Usually they preceded her menses, but in most cases they were temporally connected with them in some way. Emotional strain and overexertion always provoked these attacks. They were especially severe during school finals and during the entrance examinations for college.

"Do you have any presentiment of a future attack?"

"Sometimes several hours before one, or even a day or two before, my mood will change all of a sudden. I start feeling weak, exhausted, unaccountably anxious. Or just the opposite: I suddenly become very animated, even excited without the slightest reason. Just before the beginning of an attack, when there is still no hint of a headache, I suddenly feel an extraordinary lightness, see everything very vividly and in sharp relief, as if the light had become brighter. Sounds also seem to become sharper. But this state does not last long: sometimes up to several minutes or about an hour. Straight after this, the attack begins."

"You get a splitting headache?"

"No. Sometimes there is no headache at all. But suddenly I may see chains of small brilliant stars or brilliant zigzag-like sparkles arranged in horseshoe-shaped figures. Sometimes they shift. This continues for

10-20 minutes and then gradually disappears. But sometimes these visual sensations merge with the developing pain. At this moment part of my field of vision seems to get shut off by a small "blind", or it becomes difficult to speak, to think."

"How do sounds affect you during an attack?

"Terribly. I had noticed already long ago that during an attack, sounds and light have a very bad effect. They make the headache much worse. I try to be alone, to close my eyes. Even the sympathy of my family and friends makes it worse, though I know that they want to help. And sometimes there are also brief unpleasant sensations around my heart. It is not real pain, but rather an ache."

"Have you ever looked at youself in the mirror during an attack?"

"I look awful. I become terribly pale, especially the right side of my face—the side where it hurts—or maybe this is just my imagination. My eyes are so full of suffering that I am filled with self-pity. Sometimes my face suddenly turns from pale to red, but this does not change the character of the attack. Coughing makes it even worse. Then everything progresses according to the same pattern up to the vomiting that brings relief. An attack usually lasts several hours, but sometimes it may last up to twenty four hours, or even longer. Yes, and sometimes I develop a huge appetite and just cannot eat enough. And one other thing: I have to visit the toilet frequently."

"What do you do when you have an attack? You have probably tried a lot of different things over so many years. What helps you?"

"I have tried everything! Pain-killers—pills and powders—have either a very slight effect, or none at all. Peace and quiet help a bit. I feel a little better if I bind my head tightly with a towel or place my feet in a basin of hot water. Mustard poultices help a bit. My mother applies them between my shoulder blades and at the nape of my neck, near the hairline."

"Do you take any medicine during the periods between the attacks?"

"No. What is the use?"

"Are you aware of your diagnosis?"

"I have been told that I suffer from migraines. Tell me, will my children also have them?"

"Judging from appearances, you do suffer from migraines. But let me first give you a check-up. There is nothing disastrous in your situation. We can set you right."

A thorough examination of the patient revealed no special pathology of the nervous system. Only the facial pain spots were a bit sensitive, mainly on the right side.

Even that would probably disappear by the following day. The arterial pressure was normal. The fundus of the eye also showed no irregularities. In short, the diagnosis was quite clear—migraine. It turned out that her mother also had unilateral headaches now and then, with the pain centred mainly in the region of the temples and the crown of the head. But they were never so bad as Lena's.

What is the nature of this disease? In migraine the pain is almost always centred in one half of the head. That is why doctors also call this disease hemicrania (from the Greek "hemi", meaning half, and "cranion", meaning skull). This disease has been known since ancient times. Its description can be found in every ancient medical treatise and canon. It is distinguished from other headaches. Already ancient physicians discriminated between different types of headaches, knew their various manifestations and nuances, and treated them accordingly. Galen, Paracelsus, Avicenna, and others wrote about "pain in one half of the head".

It is very sad, but neither the wisdom of ancient medicine, nor the efforts of well-equipped modern science have been able so far to establish the exact cause of migraine. However, it has been established that these headaches are usually connected with changes in the cerebral vessels and the meninges. A huge number of factors can cause such changes, but hormonal factors, or, to be more exact, neurohormonal ones, evidently play the leading role. This is why for most women the development of a migraine attack is closely connected with the menses, and after the menopause, such attacks quite often stop. Men also suffer from migraine, but much more rarely. The role of heredity can be traced in most patients very clearly: in women migraine is mostly passed down the female line; in men, down both the female and the male lines.

What provokes a migraine attack? Such factors as overcooling or overheating, overexertion, and not enough sleep. An attack may develop if the patient sits for a long time in a stuffy room full of cigarette smoke, where there is not enough oxygen. The emotional state of a person plays an important role. Negative stress conditions can also provoke migraine attacks. What actually is a migraine attack?

Formerly it was believed that migraines were caused by a sudden sharp spasm of the cerebral vessels and the vessels of the meninges, because the face of the sufferer suddenly turned pale, which meant that the blood vessels had constricted. However, it was subsequently established that it was quite the other way round. The head is supplied with blood through two large carotid arteries, each of which branches into an external and an internal carotid artery. These last two arteries can be regulated independently of the mother artery. There may be such a state of affairs when certain factors cause a sudden redistribution of the vascular tone in the system of the internal and external carotid arteries, while the blood flow in the common carotid artery remains unchanged. For instance, there may first be a sharp increase in the vascular tone of the internal carotid artery. The velocity of the blood flow in it will increase, and as a result, the blood supply to certain parts of the brain will suddenly become greater. This is the reason for the impression that everything looks more vivid and distinct, that hearing seems keener, and that general activity also increases. At the same time the tone of the vessels in the system of the external carotid artery falls just as sharply, causing the face to redden. This state lasts for several minutes. It is the herald of an attack; indeed, it is actually the first stage of a migraine.

During the second stage the amount of blood flowing to the head through the common carotid artery remains the same, but a rapid redistribution of the blood supply occurs and the face turns pale. This means that the vessels in the system of the external carotid artery have constricted. At the same time the vessels in the system of the internal carotid artery dilate suddenly. It is precisely their dilatation, and not their spasm, as was formerly believed, that causes headaches. The greatest dilatation occurs in the vessels of the meninges, thus stimulating the pain receptors in their own walls and those in the meninges. In some places, vascular dystonia can be observed: this means that separate sections along a short length of the blood vessel are markedly dilated, while others are constricted. The vascular wall in the region of such drops is injured especially badly. Local pains develop in the meninges themselves. The headache gets progressively worse, becoming almost unbearable. The vascular changes lead to a rise in the intracranial pressure, which further increases the irritation of the meninges. The resulting reaction is nausea and, finally, vomiting. After that the patient always feels better and the attack practically subsides.

The explanation is quite simple. Vomiting in this case is a defense reaction that expells excess fluid from the body. This is called natural dehydration. It results in the reduction of fluid pressure and in the disappearance of local oedema in the meninges. In this way the body helps itself. But this self-aid is a rather belated event, as the patient has already suffered a great deal. Because of this, the aim of the physician is to do everything possible to prevent an attack from developing, or at least to considerably lessen its intensity.

A migraine consists of two opposite phases: a sharp vasoconstriction and an even sharper vasodilatation, which, strictly speaking, causes the headache. Then what measures can be considered the most effective against migraine—those that evoke dilatation or those that evoke constriction of the blood vessels? Taking vasoconstrictor drugs during the second phase of the attack can considerably alleviate it, or even completely arrest it. Vasodilators, on the contrary, will intensify the attack or prolong it. Consequently, hot foot baths have a good effect. It also helps to plunge the hands into very warm water. This leads to a redistribution of the vascular tone in the body and eases the suffering. Mustard poultices and irritant ointments work on the same principle. As a preventive measure, a daily dose of practically harmless vasodilators is prescribed (such as nicotinic acid—the P-P factor, papaverine and others) to be taken over a long period of time. These measures can completely prevent the first stage of the attack. We prevent the vasospasm as far as possible and, consequently, the attack does not develop. Practice shows that this is the most effective method for preventing attacks of migraine.

But, of course, these are not the only preventive measures. One must keep to a strict regime, not only regarding rest and sleep, but meals as well. One must do physical exercises and train the blood vessels. It should be remembered that every internal disease causes vascular disturbances; therefore, they should not be allowed to become chronic. In short, the main thing is not to disregard one's health, but to pay attention to it, and to observe strictly all the measures recommended by the doctor. And the sooner the migraine sufferer starts carrying out all the doctor's instructions, the better he or she will feel, because each migraine attack sort of paves the way for the next one, making it easier for it to start.

Since the time when we thoroughly discussed her condition, Lena's attacks have become rare. They happen mainly when she breaks her regime.

Migraine, however, is but one of the causes of headaches. The following is another case.

"Nature has no bad weather—every kind of weather is a blessing..." These words from the popular Russian song were of small comfort. The day before, the sky was overcast with dark clouds, and with the rain coming down in sheets, it had completely driven away any hopes of a "blessing". But today all of a sudden, quite contrary to the weather forcast and contrary to the predictions of knowledgeable old ladies, the sky had cleared completely. By one o'clock we could not believe our eyes—it was 30°C in the shade. A real hothouse!

Such changes of temperature, with 20° differences, are quite frequent. This time it happened on a Sunday. My country neighbour came looking for me: his wife was very ill.

She was a woman of 48, plumpish, with a slightly puffy face. Her hands and feet were also slightly puffy, or, as we call it, pasty. She spoke in a low, rather monotonous voice, using short sentences. One sensed that any noise, even the sound of her own voice, disturbed her.

My examination revealed nothing of any consequence. Her pulse was only slightly more rapid than normal, but was very tense. The first heart sound was greatly amplified. The blood pressure was markedly elevated: 240 over 120 mm. Already this in itself was a very serious matter. It turned out that she had suffered from hypertension for a long time, for about 15 years. She had got quite accustomed to increases in blood pressure and did not pay much attention to them. She had also got used to headaches, which were mostly located at the back of the head.

What she had was a typical hypertensive crisis. She had all the drugs that she usually took for high pressure. In addition to them, I recommended a hot foot-bath and a mustard poultice between the shoulder blades. Her condition improved rapidly, and an hour later her headache was gone. On the way back to my cottage I reflected that not everyone could regard "every king of weather" as "a blessing". Especially if the weather changes were accompanied by appreciable shifts in temperature, atmospheric pressure, and humidity. It is not for nothing that a special medical term, "meteopathy", i.e. suffering connected with changes in meteorological conditions, has come into use in recent years. People suffering from cardiovascular diseases and hypertension are especially sensitive to such changes. Individual preventive treatment is recommended for such people. The unpleasant consequences of meteopathy can be avoided with the aid of very simple measures. When expecting weather changes, and especially during the period when these changes occur, one should keep more strictly to one's regime, avoid overexertion, and not forget to take one's prescribed medicine at the appropriate times.

Evidently one should also keep in mind the following fact. Headaches are not the only symptom of this disease. The point is that a person can feel pain at any given moment only in one place. This is a characteristic property of the nervous system. This problem has been studied for a very long time and treatments, such as mustard poultices, "burning" ointments, etc. are based on this principle.

I have often been asked if there are any especially typical headaches. No, there are not. A headache is an individual disease every time. Only a doctor can decide what each headache means, because quite often a headache is a danger signal. For example, inflammatory diseases of the brain and the meninges are always accompanied by headaches, which are one of the main symptoms. Just as often, headaches can be signs of brain tumours and tumours of the meninges, and signs of cysts and other processes that lead to a rapid increase in intracranial pressure, and, as a result, to intense stimulation of the meninges and the cerebral blood vessels. Only a doctor can make a diagnosis based on the wide knowledge and experience acquired, and taking into account the results of various tests (X-ray of the skull, examination of the fundus of the eye, analysis of the cerebrospinal fluid and, lately, computer tomography). Therefore, it should be repeated once again that headaches are not a disease in themselves, but only a symptom, sometimes a formidable one, of a disease.

Fortunately, modern medicine resolves the majority of the most serious problems quite effectively. Tumours and cysts, for instance, can be successfully removed by surgery. Such a disease as meningococcal epidemic meningitis, which used to kill over 80% of those affected and left the survivers with incurable defects, including psychic ones, can now be completely cured. Many cardiovascular diseases, as well as disturbances of the circulation of the cerebrospinal fluid caused by various factors, are being successfully treated today. However, the treatment of these widely differing diseases is based on absolutely different principles. One can talk of certain general principles of treatment only for specific groups of diseases of the nervous system, such as vascular, infectious, traumatic diseases, etc. By acting on the immediate cause of the headache we can considerably alleviate the suffering of the patient and prevent a recurrence. For example, in cases where the headache is caused by partial dehydration of the body tissues (irrespective of the cause of this state) and by a drop in the pressure of the cerebrospinal fluid the patient will at once start feeling better if he or she drinks one or two cups of strong tea (better with a slice of lemon) or just some water. Whereas if the headaches are caused by a rise in blood pressure in a patient suffering from hypertension, the same cup of tea may have a reverse effect—make them worse. In this case only drugs that lower the blood pressure will really help.

This kind of general approach to the treatment and prevention of headaches of various origin is often applied in medical practice and utilized by the patients themselves. This can be illustrated by several examples.

From my college days I remember one of our professors telling us stories about famous Russian physicians and their powers of observation. One of the most striking was a case from the practice of the eminent therapist M. Ya. Mudrov. At the beginning of the 19th century, when some merchants still had shops on the territory of the Moscow Kremlin, a shopkeeper came to consult Doctor Mudrov about his terrible headaches. This visit occurred in the winter. After examining the patient, the doctor asked him: "Through which gates do you pass when you go to your shop?"

"Through the Spassky Gates," the patient replied.

"Well, from tomorrow on you will ride through the Borovitsky Gates." And the shopkeeper had no more headaches.

The explanation was simple. At that time an icon of the Virgin hung on the Spassky Gates. When passing through these gates in the winter in an open carriage the merchant always took off his cap prior to crossing himself before the icon. However, on the Borovitsky Gates there was no icon.

Evidently his headaches were caused by a disease of the muscles at the roots of the hair. These are very small muscles that are present in every hair bulb. If these muscles, all together, suddenly contract, one's hair will practically stand on end. If one has a cold or an inflammatory disease, these muscles can become very painful. One gets the impression that one's whole head hurts, and that the pain comes from within the skull. However, after questioning and examining such a patient, it becomes evident that the pain appears or increases on any attempt to change the position of the hairs, for instance when the hair is combed or just smoothed.

I have often encountered such diseases during my long practice, especially in people who make a show of going bareheaded in winter in spite of the cold. Such diseases were very common in bygone days. Naturally, they occurred more often in winter, when the stove got cold towards morning and the rooms became chilly. Thus, the nightcap, which looks like a fool's cap, with a tassel to boot, was not just a freak of the current fashion! Actually it was both a medical recommendation and a dire necessity: there was less chance of falling ill if you wore a cap. And if you already happened to be ill, it helped to get well quicker.

Today a cap also often helps to get rid of a disease. I invariably recommend it in cases of diseases of the muscles of the hair roots, as well as in certain other cases. This is in addition to medicine, of course. However, when using a cap one must also be aware of several simple rules. On no account should the cap squeeze the head. Better that it be light, almost not felt on the head, and at the same time, loose (otherwise it will have just the opposite effect: the skin of the head will not be able to respire and overheating will result). The cap should be made of soft woolen material, or flannel (not from synthetic material). Simple, isn't it? But you can take my word that it is very effective. A cap will often help when there are headaches of other origin as well, simply because it prevents excessive cooling of the head and helps to normalize the circulation.

But sometimes a hat, if it is tight and squeezes the head, can itself become the cause of an ailment. In this case all the vessels that carry blood to the skin of the head are badly compressed. The outflow of venous blood from the skin of the head is also impeded. This hampers, to a certain extent, the outflow of venous blood from inside the skull... This is the reason for the warning signal—a headache.

Then why, if the situation is so simple, can't a person determine the cause of his headache in every case himself? Evidently the reason is that a headache does not develop at once. After all, the veins running from the skin of the head are not the only pathway for the outflow of blood. And even if one removes the tight hat when a headache starts, the pain will not subside at once.

Of course, the pain can be alleviated by drugs, but only temporarily. Wearing a tight hat for a long time will make it more difficult to get rid of one's headaches in the future. Thus, when buying a hat, one should think not only of the wind that might tear it off one's head. Besides, it is important for the skin of the head to freely respire under the hat. What happens if the hat is made of thick, heavy material, or of light material that does not let the air through? Overheating may occur, and the skin of the head is often covered with perspiration. The circulation suffers as a result and the head starts feeling "heavy" and as if it were "not your own". And here is where the pains begin, which increase...

Have you noticed that summer hats are often made of straw? If they are made of thicker material, they have vents for airing. Many types of berets also have small, metal-rimmed holes. All this is done out of concern for our health and well-being. But what about the enormous papakhas (tall fur hats usually made of sheepskin) that are worn by the natives of the Caucasus and the hot climates of Central Asia? The dense fur and the air inside the papakha protect the head from the hot sun. Remember that in Central Asia it is customary to shave the head. All this is done not without reason!

When I used to see pictures of John Kennedy in the papers, I wondered whether the American President's predilection for carelessly unbuttoned collars was based on medical advice or on just plain foppery. His tie was also always a bit loose, so that his neck was not compressed in any way, whereas the fashion of the period called for rather tight starched collars... This curiosity of mine was purely professional. The point is that the details of our attire such as a tight collar, tie, or trouser belt (and not only these things), can sometimes have a direct bearing on our health. This is especially true after the age of 45 or 50.

The neck is not only a joint of very intricate design that ensures the free movement of the head. It is also a very important and complicated organ through which the blood supply to the head and the outflow of blood and lymph from it is effected. The gullet and the windpipe pass inside the neck. Inside the cervical vertebrae, the cervical cord is hidden. Through the intervals between the vertebrae, the nerve roots emerge and then run in various directions. Very important blood vessels, such as the carotid artery, also pass through the neck. And, finally, there are nerve ganglions in the region of the neck that carry out such regulatory functions as the redistribution of blood between the head and the body on changing from a vertical to a horizontal position. Thus, it is clear that a tight collar always restricts the movements of the neck, at least to some extent. It also compresses the blood vessels to a certain extent, thus impeding the blood and lymph circulation. And what is the result? One gets headaches, one's head feels heavy, thinking becomes difficult, and one's responses are slowed.

Just notice how at a meeting, especially if it is a long one and held in a poorly ventilated room, the hands of those present go to their collars and ties to try to loosen them from around the neck. And at once they feel better. You can draw your own conclusions.

A trouser belt that presses on the stomach promotes disturbances of circulation and definitely affects the functioning of the intestine. Quite often it becomes the cause of pain in the region of the stomach and in the small of the back. In this case one should wear suspenders. Belts or suspenders that are too small are detrimental to one's health.

Sometimes headaches can be caused by spectacles. Over a period of many centuries, spectacles, in the process of being perfected, have gone through a number of major alterations. There are glasses for the near-sighted and the far-sighted, glasses for reading, special spectacles for the workers of certain professions, sunglasses and many other types of spectacles. Although there are spectacles of various design, the most widely used in everyday life is the commonest type of spectacles. They consist of an arch and a contrivance for support on the bridge of the nose, two symmetrical oval frames with lenses, and two sidepieces that go behind the ears. This is all there is. But under certain conditions each of these components can cause headaches!

In the first place headaches can be caused by poorly adjusted optical lenses. Some people choose glasses at the pharmacist's just by trying on several pairs, without having previously consulted an ophthalmologist. Even a slight mismatch of the correcting lenses can be the cause of headaches. This is even more true in the case of astigmatism, for which it is necessary to wear special correcting lenses with different curvatures in different parts of the spherical surface.

It is also very important to select eyeglasses with a correct alignment of the axes of the eyes; otherwise, the optical correction will again be poor and this will also lead to headaches. Even simple protective glasses with plain lenses can cause unpleasant sensations and then persistent headaches. Why does this happen? It is the refractive properties of glass that are to blame. Only if the lenses of the non-corrective protective spectacles are spherical in shape will there be no unpleasant sensations. The same is true for protective spectacles with tinted lenses.

But why does poor eyesight cause headaches? The explanation is quite simple. Any shift in the optical axis of the eye or distortion of the optical system is continually corrected by the muscles of the eyeballs and the muscles of the crystalline lens, which sometimes have to strain to the utmost to correct the crystalline lens—the main optical instrument of the eye. Prolonged strain tires the muscles. Eye muscle fatigue also entails an increased strain on the retina, with the aid of which we perceive the visual images of all that surrounds us. This calls for a considerable increase in the blood supply.

Have you ever seen anybody who has been reading or writing for a long time, or doing some precise operation that requires prolonged eye strain? How bloodshot their eyes become! Sometimes, even the eyelids swell. The eye is not just a sense organ. As the well-known ophthalmologist Professor Krasnov so aptly put it, the eye can also be regarded as a section of the brain pushed out onto the periphery. It even has a common blood supply with the brain, as well as common features and the same reasons for headaches. This is why the simple advice to visit an ophthalmologist and get the right glasses so often helps to terminate such headaches.

Now, as to the sidepieces: in some cases they are too tight and press on the temples. Sometimes they are made tight on purpose so that the glasses sit more firmly on the nose. It sounds like such a trifle, but the temporal artery happens to run just under the place where the sidepieces press on the temporal bone. This pressure evokes pain, first in the region of the temples; then the pain spreads, involving most of the head. The pain does not necessarily begin simultaneously on both sides of the head: it may be unilateral. Actually, this is more often the case.

Advanced cases of temporal traumatic arteritis require special treatment, always under the supervision of a doctor. Self-treatment will not help and will only complicate matters. Drugs that relieve pain do not cure, but only cause self-delusion. And what about preventive measures? They are obvious.

Another, also frequent, cause of headaches that are connected with wearing spectacles is due to the arch that holds the frames of the lenses together. This arch often has small supporting platforms, either mobile or immobile, and of various size and design. This is quite natural, because people have noses of different shape: narrow and broad, and differently tilted. These platforms rest on both sides of the bridge of the nose, just where a lot of blood vessels run. Because of this, if the position of these platforms is not quite right, wearing glasses for a prolonged period can cause headaches, Medicines will not help in this case. They can only bring temporary relief.

Formerly pince-nez were the fashion. Now you see them only in old photographs. They were comparatively light glasses without sidepieces. The lenses had no frames and were held together by a graceful metal arch. A light chain with a wire sidepiece was fixed to the lenses on one side of the pince-nez. If they fell off by chance they did not break, but hung on this chain. The pince-nez were held on the nose by two spring clamps that gripped the bridge of the nose. This caused frequent headaches. Evidently people stopped using pince-nez not only because they went out of fashion. Maybe the real reason for the fact that we have not returned to the pince-nez today, in spite of the popularity of the "retro" style, is for these reasons.

It was already mentioned that the rational consumption of liquid, e.g. water, juices, and, of course, all products that contain water (such as fruit and vegetables), is very important for the prevention of headaches. Here is another example.

One hot summer day, a young man of twenty five was admitted to our hospital. He was unable to give a coherent explanation of his condition: he just held his head and moaned. His neighbours, who had brought him to the hospital, also could not tell us anything definite. The case called for urgent measures. Examination revealed that his skin and tongue were dry; his eyes were sunken; the pulse was weak, and sometimes thready. This meant that his body was dehydrated. We at once started intravenous fluid replacement, and tried to make him drink water. We also took all the necessary measures to stimulate his cardiac function. The result looked like a real miracle. An hour later he became fully conscious and his headache subsided, but a general weakness and listlessness still remained. Only then did he remember what had happened to him. What was the cause of his condition? It had nearly killed him!

Just imagine, it was a kilogram of dry-cured fish that had been bought the day before that was to blame. He remembered it in the middle of the day, at the hottest time, when he fancied something salty. But salty food, as is generally known, reduces the feeling of thirst in hot weather. He ate the whole kilogram of Caspian roach and felt absolutely no thirst. Then, all of a sudden, he felt weak, his head felt "funny", pain gripped his temples, and the back of his head started to ache. In a short while he already had "a raging headache". Our patient came to, as was already mentioned, at the hospital. All the events in between were "blanked out": he remembered nothing.

In hot weather, when one perspires much

more, consuming too much salt without taking in an adequate amount of water with it leads to rapid dehydration of the body. This results in the redistribution of liquid in the tissues, the increased concentration of blood, the diminished production of cerebrospinal fluid, and, consequently, in a sharp decrease in intracranial pressure. The organism constantly needs a sufficient amount of water. As one can see, a significant water deficiency can not only cause intense headaches; it can also have other extremely serious consequences.

Many people restrict their daily amount of water so as not to put on weight (there is absolutely no logic in such behaviour), or so as not to visit the toilet too often (especially at night). All sorts of other unreasonable arguments are also presented. One should restrict the daily water intake (with reason) only on the advice of one's doctor.

To smoke or not to smoke? Can one even ask such a question today? Scientific research has presented reliable evidence that smoking is not just bad for one's health: it is actually dangerous. Research carried out in different countries has shown that smokers get cancer more often than non-smokers. Smokers create unbearable conditions for their heart and blood vessels. Both the vessels and the heart age more rapidly, because the organism is full of poison. Smokers also shorten the life-span of non-smokers who breath in the smoke of other people's cigarettes and so, willy-nilly, become smokers.

Smoking is also directly related to our subject.

Imagine that a smoker has lit a cigarette. The smoke is actively inhaled into the lungs with the air. As a result the smoker already does not get a sufficient amount of oxygen. The oxygen deficiency gradually increases. It also increases because in due course the lungs become filled with the waste products of smoking and are obstructed by them. Oxygen saturation of the blood, which is the main function of the lungs, decreases markedly. The lungs attempt to adjust to the situation: they expand and increase their volume, losing their elasticity in the process. Pulmonary emphysema develops, and the cerebral blood vessels react violently to this. In some places they respond with spasms that increase the velocity of the blood flow; in others they dilate sharply, thus increasing the surface area of the vascular walls and, consequently, the oxygen exchange between blood and tissues. Thus, vascular dystonia, i.e. a marked redistribution of vascular tone, results. This causes constant headaches. Chronic oxygen deficiency also leads to sleep disturbances. Consequently, smoking, especially heavy smoking, is sure to lead to diseases of the nervous system, the first signs of which are headaches and insomnia.

Mark Twain joked rather wryly that nothing could be easier than to quit smoking, because he had done it ever so many times!

Why do people find it so hard to stop smoking? Evidently because cigarettes have an effect that is very similar to that of narcotics. One gets used to cigarettes, and a persistent need for nicotine develops. Of the many measures against smoking, will-power is the most effective. And a doctor can help to fortify the will if it is weak. However, if one decides to quit smoking, it is not advised to do this during an acute disease or during an exacerbation of a chronic one. If one suddenly stops smoking there will be temporary destabilization of the functions of the vascular system, and the effects of an "abstinence syndrome" will be added to one's illness. All this may aggravate the acute condition. From this standpoint the question of whether to stop smoking or not is not always an unequivocal matter, and thus, it should be discussed with one's doctor.

Of course, there are many such problems. It is said that, in the long run, life is a dangerous thing: it leads to death. However, irony aside, we have already discussed quite a few problems that only at first glance seem to have no direct relation to headaches, And another problem that concerns absolutely everybody is whether or not we chew correctly. Just judge for yourself. Malocclusion impairs the function of the jaw joints and the masticatory muscles. Consequently, it can evoke pain and become one of the factors that cause trigeminal neuralgia (an ailment that the reader has probably heard of) and, finally, headaches. Badly fitting dentures can sometimes lead to the same results.

I have often gone on business trips to remote parts of the USSR, including its northern regions. In those parts, people often dry meat for the winter. I have eaten dried bear meat and found it quite tasty, but you have to chew hard, if you do not want to stay hungry. I noticed at the time that there were almost no cases of trigeminal neuralgia among the local population. It is clear that chewing is necessary not only for the proper grinding and digestion of food, but also for the proper functioning of the masticatory muscles and jaw joints.

Thus, it appears as if almost any factor can lead to headaches. But one may ask: Are there actually so many real, major causes of headaches? There are many more than one would believe from first impressions! The patient does not and cannot know all the possible causes. His or her main aim is to get rid of the ailment. The task of the physician is not only to help the patient in this, but also to explain what relationship this or that disease or circumstance might have to the headache.

If I, as a neuropathologist, find that the headaches are connected with a disease of the paranasal sinuses, for example, maxillary sinusitis, or with a disease of the ears, I shall naturally send the patient to a specialist (in this case to an otolaryngologist). If I decide that they result from a disease of the teeth or jaws, I shall send him to a dentist. It is my duty to explain to the patient why he or she gets headaches, and how the headaches are related to various factors. Then the patient will make a real effort to get rid both of his disease and of the headaches that accompany it.

In short, there are no headaches without a cause. It is my business to establish this cause. A thorough examination is carried out for this purpose: the blood pressure is checked, the fundus of the eye is examined, electroencephalography is performed, and so on. The type of the nervous system of the patient, temperament, and even the situation at the patient's home and office, have to be taken into account.

Any family discord, a severe conflict at the office, or even a chance quarrel may cause an emotional upheaval and great psychological stress. Stress affects people differently, but it has a particularly severe effect on people that are not so even-tempered, on people with a weaker type of nervous system. It evokes variously manifested neurotic states, i.e. neuroses. Any type of neurosis always affects the vascular system, which means that an angioneurosis is added to the initial disturbance. People with a strong character often suppress their emotions and their reactions, do not allow them to get out of hand. But as a rule it is impossible to suppress the angioneurosis, and it is just the latter that is one of the main reasons for those headaches "without cause" that are seen so frequently.

In such cases one not only can, but should, take tranquilizers, as well as drugs that have a beneficial effect on the blood vessels and relieve pain. But people ramain true to their natures, and one cannot change one's nature, just as it is not always possible to change the situation that has led to the disease. At best, the doctor can only advise the patient as to what measures to take under the circumstances.

Some people take an unwarrantedly tragic view of even the slightest mishap. Later, the same patient will say: "I understood everything perfectly well, but I just could not help it..." And, indeed, this is true, because the patient's attitude was dictated by his or her nature and nervous system (if, of course, it was not just plain lack of self-discipline).

I foresee a rejoinder: but people do have strong and weak characters, high and low blood pressure, etc. Don't some of them have certain advantages? Do you really mean that any factor can cause headaches in anyone? Life would be quite unbearable if this were the case!

There is no need to exaggerate. It is just that this discussion addresses the problem of headaches. Actually everything is not too bad. After all, practically everybody has headaches from time to time and survives. What is important is to know what causes these headaches, and to be able to cope with them on one's own in certain cases. More serious headaches require the advise of a doctor, in particular of neuropathologist.

Naturally, all the factors that can cause headaches have not been discussed in this chapter. Many diseases of various organs (for instance, of the stomach, the liver, the kidneys, the intestine) may be accompanied by headaches. Even chronic constipation can cause them. Quite often, diseases of the spine, such as osteochondrosis, are accompanied by headaches, especially if the cervical spine is involved. Incidently, headaches often occur with sclerosis of the cerebral blood vessels, as well as with rheumatic vascular lesions. Various cardiac diseases can also cause headaches. Thus, almost any illness can cause headaches. That is why it is so important to establish the cause. This will determine the treatment chosen.

One often hears the term a "usual headache". It is usual in the sense that the patient already knows its manifestations. In such cases the patients often employ their own treatments, which do not necessarily include pills. There are also remedies from folk medicine.

If there is the usual, customary pain, one can try to ease it in the following manner: squeeze hard the bridge of the nose at its narrowest part for no longer than a minute. This will definitely make one feel better. The procedure can be repeated, though not too often.

Another remedy, just as simple, consists of the following: the head is wrapped with a strip of light material that is neither too wide, nor too narrow. This must be done so that the strip should pass just above the eyebrows and the ears and press lightly on the skin. This measure is especially effective for headaches resulting from a drop in blood pressure.

Many people find hot foot baths a great help, but the water should not be too hot, otherwise they will induce the reverse effect. A hot-water bottle on the stomach helps in some cases. Mustard poultices can also be useful: they should be applied either on the back of the neck, the back of the head, between the shoulder blades, or on the calves of the legs (but not on all these places simultaneously). Mustard poultices can also help when the patient is suffering from high blood pressure.

It used to be customary to rub the temples lightly with an alcohol solution of formic acid, some aromatic essence, or eau-de-cologne in case of a headache. Today, special, slightly irritating ointments are used to the same effect. They should be rubbed lightly into the skin of the temples on an area no larger than a penny and into the skin of the forehead just above the nose.

If one gets a headache outside (for instance, in cold weather the whole forehead or the parts just above the eyes may hurt) one should immediately pull a hat or kerchief down to one's eyes. Cooling often causes prolonged and steady headaches.

All these measures are easy to follow and would not be opposed by any doctor. However, if one suddenly begins to get headaches (with no history of them), and if they are prolonged and, what is worse, have a tendency to become more intense, one must consult a doctor without delay! To say nothing of cases when headaches accompany high temperature, fever, nausea, vomiting, pains in other places, etc. On no account should one practice self-treatment. My wide professional experience obliges me to caution the reader against this. The warning is a very serious one, because quite often the problem involves not only a question of health, but of life itself.

Errors of Nature or Our Own Mistakes?

Radiculitis, Lumbago, Sciatica

It is no surprise for any doctor to be called up during the night. This time the caller happened to be an acquaintance. He sounded very worried.

"Please forgive me for waking you up, but I think my wife has had an infarction... It happened at about 11 p.m. We were just getting ready for bed when she suddenly felt a terrible pain in her heart. I didn't want to trouble you, but all my efforts to help her have been in vain. She's tried taking validol and valocordin. I was thinking of calling an ambulance, but decided to ring you up first."

"That means that three hours have passed since it happened! I'll be there in thirty minutes."

Driving through the sleeping city has certain advantages: the distances seem shorter. The lights were on in all the rooms. The patient's daughter, wearing a bathrobe, was sitting in an armchair at her mother's bedside with her feet drawn up under her. The patient was lying flat on her back, looking pale, tense, with anxious eyes, and she appeared afraid to make the slightest movement.

I listened to her heart thoroughly, checked her blood pressure on both arms and felt her pulse once more. Everything was in order. I felt her whole neck, and then I helped the patient to turn carefully onto her side. I examined the muscles of the neck and back, each separate vertebra, and the muscles that passed down both sides of the backbone. Then I checked her reflexes and went through all the other customary procedures. When I informed the patient of my opinion, she was astounded.

"There is no infarction. Get up carefully and have a seat at the table. I believe we were promised some coffee. Don't worry, it is definitely not an infarction. You have radiculitis."

The surprise made her sit up so quickly that there was no time to become alarmed. She looked at me in astonishment.

"Do you really mean that I have radiculitis?"

"Yes, I do. But just take these two pills before your coffee."

Still not convinced, the patient felt with her toes for her slippers, grasping the edge of the bed tensely. She held her body unusually straight, holding her head rigidly in line with her torso. She did not dare to turn or bend it. Nevertheless, she got up, and cautiously walked the two meters to the table. She carefully carried her body without moving her head and slowly lowered herself without bending into an armchair.

I took her head in both hands, and together we cautiously turned it first to the left and then to the right. Then we bent it slightly forward and backward. She found that she could move her head and that it was not at all painful. The muscles of the shoulder girdle, however, remained distinctly tensed, and any attempt to lift her hands was painful. To be more exact, movement evoked pain not in her hands, but somewhere in the region of the torso, more to the left and to the front.

We had some coffee. After no less than 30 minutes had passed since she had taken the pills, the patient felt definitely better, though still not completely well. She held herself less rigidly and already dared to walk about the flat.

"We were quite sure that it was an infarction... What made you decide that it was radiculitis? It felt as if my heart hurt. I always thought that with radiculitis one feels pain in the small of the back that radiates down the leg."

"There may be such symptoms, but you really do have radiculitis, only it is thoracic radiculitis."

I told them that this type of radiculitis, in contrast to lumbosacral radiculitis, occurs much less frequently, and that it cannot be cured in one or two days. As to the diagnosis, in the case of thoracocervical radiculitis it is both a simple and a complicated matter, because the pains may occur in the same region as those that occur during an infarction. Of course, if the pain begins suddenly on the other side, the disease is easier to diagnose. In addition to pain in the heart, myocardial infarction usually has a number of other symptoms. But sometimes infarction is not accompanied by any great pain. The other symptoms of infarction (changes in cardiac sounds, in arterial pressure, etc.) become evident on examination of the patient. The results of the ECG allow one to make the most correct diagnosis.

What kind of a disease is radiculitis? The reader evidently knows that this disease is connected with the spine, or, as it was formerly called, with the spinal column. In animals, the spine mainly occupies a horizontal position. In humans, it really is a special type of vertical column, with several flexures: in the cervical and lumbosacral region it curves forward; in the thoracic region, slightly backward. This column is a sufficiently flexible structure. It can bend pliantly in every direction and rotate to a certain extent about its axis. The head is firmly fixed on the top cervical vertebra. It has a unique rotation axis with a vertical process—the "tooth" of the second cervical vertebra—in the centre. The lowest lumbar vertebra, the least mobile one, lies, as it were, above the sacrum. The sacrum is a massive, fixed monolithic structure consisting of five vertebrae welded together. Below the sacrum there are several mobile coccygeal vertebrae—somewhat like a small rudimentary tail which nature has hidden inside our body.

All the vertebrae have roughly the same structure. They consist of a short cylindrical body, with a height slightly less than the diameter. The spinal cord, which is surrounded by membranes and blood vessels, passes behind the cylinder through the ring formed by the vertebral arches. Short lateral processes extend from the vertebral body: in the thoracic region they are attached to the ribs. Vertebral arches also extend from the vertebral body and turn backwards to form a ring. Behind them there is a spinous process. Spinous processes form the backbone, which can be clearly seen. In addition, each vertebra has upper and lower processes that form small joints located on each side of the vertebra. In the space between the bodies of the vertebrae lie small, very durable, elastic cushions—cartilaginous formations—with a gelatinous nucleus buried in the centre of each. These cushions are the intervertebral disks that ensure sufficient spinal flexibility and provide adequate amortization. When the body is in a vertical position they bear the enormous load of its weight. But they experience the greatest load when a person moves, runs, or jumps. The lower the position of the vertebra, the larger are the size of the vertebra and the diameter of the intervertebral disks, because they have to bear a successively increasing load. Nature has calculated all of this very precisely.

The vertebral arches form a long canal in which the spinal cord lies. Its section, almost round in shape, reveals a darker, slightly spotted structure that resembles a butterfly. The tips of the wings of this butterfly are called the anterior and posterior horns of the spinal cord. The spinal roots exit from these horns through the anterior and posterior lateral surfaces of the spinal cord. There are two spinal roots on each side. The anterior root contains the motor fibres; the posterior one, the sensory fibres. Here, in the canal, they unite, forming a common bundle—the funiculus, or little cord—which passes out between the vertebrae. The extensions of these roots and funiculi run to the appropriate parts of the body, forming a number of nervous plexuses in many places. The nerve fibres and their endings permeate the whole body, reaching every cell, even the most distant ones.

This description is only a superficial review of the nervous system—sketch. But it is sufficient for one to get an idea about radiculitis and its origins.

The name of the disease comes from the Latin word *radicula* which means little root. The suffix "itis" points to the inflammatory nature of the disease (compare with meningitis, encephalitis). Radiculitis used to be regarded as such a disease: it was believed to result from an inflammatory lesion of separate spinal roots. Such cases may, of course, exist. They are usually the consequence of various, not very common, inflammatory diseases of the spinal membranes, when the roots suffer as a result of secondary infection.

The ailment that is called radiculitis in everyday practice is not an inflammatory process. In this case it is usually not the spinal roots themselves that suffer, but the funiculi that they form, which lie between the vertebrae. Funiculitis (from the Latin *funiculus* meaning small rope) is another rare diagnosis. It is also not an inflammatory process.

As was mentioned, the spine supports enormous loads. Whereas the bony structure of the vertebrae themselves is extremely strong and durable, the intervertebral disks are not so reliable. With time the disks lose their elasticity and become somewhat flatter. Sometimes small cracks appear in them and small parts of the gelatinous nucleus are gradually squeezed out through these cracks. It is these changes that are the real cause of the disease. This is why at times when a person makes an awkward movement while holding something heavy the nerve roots or the funiculus may get injured in the reduced intervertebral space. Little by little these changes occur in many intervertebral disks, but those that experience the greatest load, i.e. the lumbar disks, suffer most. Children and adolescents never suffer from radiculitis, because their intervertebral disks have not had time to age. If they do get a disease with similar symptoms, one should at once look for other serious causes.

Does this mean that with time everybody will suffer from alterations in the intervertebral disks, i.e. from radiculitis? The answer is "No".

There are various types of suffering and it is not always connected with pain.

Once I was consulting a well-built man who looked absolutely healthy. He was worried by the fact that, according to his observations, he had lost from 2 to 3 cm in height during the last three of four years. "What if this process continues," he exclaimed. "What will happen in 10 years' time? I'll become the same height as my wife! And I always used to be a head taller!"

I had to explain to him why after the age of 50 or 55, and sometimes at an earlier age, a person becomes somewhat shorter as the result of a deformation of the intervertebral disks. But this loss of height is very limited and occurs not only in males. One can regard such facts as one likes. Most people (especially mature people) attach no importance to them, and this is the normal attitude to take. But there are individuals for whom any loss, be it a centimeter of height or a wisdom tooth with cavities that had to be pulled out, results in a feeling of impairment.

But let us return to radiculitis. Although not everybody suffers from this ailment, still very many people do. It is believed that every second or third person has variously manifested symptoms of radiculitis at least once during his or her lifetime. Since everybody's intervertebral disks "age", why is it that not everybody suffers from this disease?

The most likely reason is that people lead different life-styles and are able to endure loads, physical ones included, to a different extent. Evidently from the most ancient times, the evolution of life was accompanied by a parallel development of various defense mechanisms. It is known that osteochondrosis evokes changes not only in the intervertebral disks. Reactive changes occur in the adjacent vertebrae as well. There certain processes develop that are often called "depositions of salt". This means calcification of the ligaments and other structures that helps to immobilize the adjacent vertebrae. This fixation of the position of the vertebrae, though it restricts their mobility, prevents strangulation of the nervous fibres and blood vessels that pass through these sites. This is like running repairs, occurring strictly in conformity with age and the loss in elasticity and bulk of the intervertebral disks.

Incidently, osteochondrosis does not only occur in humans. It has been observed in many animals whose spine occupies a horizontal position all their life. It is an interesting fact that dinosaurs in prehistoric times had similar alterations of the spine, as evidenced by their fossilized remains.

I have almost never observed this disease in healthy and physically well-developed people who do not suffer from metabolic disorders caused by a wrong diet. And on the contrary, people who move little, or whose activity is mainly restricted to certain types of movement, have radiculitis more often. This disease occurs even more often if the above conditions are coupled with metabolic disturbances, especially if the latter are due to self-prescribed "diets" and exotic regimes.

A great number of factors can play a significant role in the development of this disease. Even such factors as poorly designed furniture or car seats, the formerly popular feather bed, or incorrectly and unevenly distributed physical strain when involved in certain types of work can lead to radiculitis. Thus, it turns out that sometimes it is partly our own fault that we get this disease.

As with many other diseases, hereditary predisposition also plays an important role. This includes characteristic features of one's metabolism, the choice of certain diets, and even a life-style that sometimes lacks the necessary amount of physical activity. All these factors, if coupled with conditions that favour the development of the disease, will certainly lead to pathology. Metabolic disturbances are especially common. For instance, if a patient suffering from radiculitis also happens to be predisposed to gout, then tomatoes can cause an exacerbation of radiculitis.

What should be done to prevent this predisposition from developing into a disease? Actually, there is no need to do anything special. General physical development, i.e. doing physical exercises that develop all the muscles of the body evenly, will largely prevent the development of radiculitis.

Note that it is no coincidence that with radiculitis there is always a protective tensing of separate muscles, mostly those of the back. Well-developed back muscles support the correct position of the spine and fix the position of separate vertebrae, which prevents the development of this disease. This must be combined with a normal, well-balanced diet and with the prophylaxis of other diseases.

Now let us return to the case described at the beginning of the chapter. The wife of my friend had pains in the region of the heart. The ECG revealed no pathological changes. Does this mean that radiculitis is an isolated disease? We usually say that any disturbance, any injury, always evokes a response in the whole organism. The same is true for radiculitis.

Besides pain, what are the other manifestations of radiculitis? There are quite a few. For instance, pain may cause a rise in arterial pressure. Cervicothoracic radiculitis in itself is far from harmless for the heart. Nerve impulses from the spinal cord to the heart and afferent impulses returning from the heart are transmitted along the same nerve fibres that are compressed between the vertebrae. At the same site between the vertebrae there is also an intervertebral sympathetic ganglion that participates in regulating cardiac circulation. Thus, in this case radiculitis not only causes pain, but also disrupts cardiac innervation, cardiac trophicity, and the regulation of cardiac performance. Consequently, the rapid curing of radiculitis also means the removal of the unfavourable effect on the internal organs, because all of them are connected with the central nervous system precisely through the spinal roots.

In addition to the widely known term "radiculitis", other terms, such as "sciatica", "lumbago", "myositis", and "pain in the back", are often used. Let us specify what each of these terms means.

The term radiculitis usually means a lesion of the spinal roots, both anterior and posterior, of the funiculus that unites them, and of the extension of the spinal roots up to the nervous plexus or to where they join to form the nerve. For instance, the most common case is a lesion of the lumbar roots, which join after the plexus to form the sciatic nerve. If this happens, there will also be symptoms of impairment of the function of this nerve, such as respective changes in sensation and in the reflexes. There may even be restriction of mobility in certain muscles of the leg. Quite often there may be a simultaneous disturbance of blood supply and trophicity (nutrition of the tissues), and as a result, the leg becomes somewhat paler, or even cyanotic, and the skin begins to peel. As both lumbar and sacral roots are affected, this type of radiculitis is also often called lumbosacral radiculitis.

And what kind of disease is called lumbago, or myositis, (which is the same thing)? The following is a patient's description of the onset of this ailment.

"Yesterday I decided to move a table. I had only just taken hold of it, when a pain shot through my back. The pain was excruciating. Not only was I unable to straighten myself; I could not even turn. I was dragged with great difficulty to the bed. How hard it was to try to unbend!"

Radiculitis can also start like lumbago, but as a rule, it does not begin so acutely. An attack of lumbago usually begins suddenly on lifting something heavy, especially if it really weighs a lot. It can also start as a result of an "awkward" movement that previously had been performed quite freely. This sudden constraint lasts a long time. Any attempts to turn in bed, to bend the leg at the knee sharply increase the pain in the lumbar and sacral regions. Even coughing or sneezing makes the pain radiate sharply into the small of the back. The muscles of the small of the back remain tense all the time, and the lumbar cavity flattens out. Sometimes the lumbar spine even curves to one side.

Why does all of this occur? Strange as it may seem, in this case pain is a defense reaction. It prevents movement, because fixing the position of the vertebrae, between which the affected intervertebral disks lie, prevents an even greater constriction of the spinal root nerve fibres. These defense reactions are so sudden and so powerful that they cause tremendous muscular overstrain, sometimes even accompanied by the rupture of separate muscular fibres and their membranes.

A person stricken with lumbago (myositis) may suffer from several days to several weeks. One must apply heat to the affected area over a long period of time, take painkillers, use irritating ointments, undergo physiotherapy, and do many other things. This illness is not dangerous, but it wears one out.

And what about sciatica? This term means neuralgia of the sciatic nerve, i.e. a sensation of sharp pain along this nerve. In most cases, sciatica is one of the manifestations of lumbosacral radiculitis. Usually the nerve is affected in the region of the lumbar plexus, or it is the pre-plexus fibres running from the spinal roots or the post-plexus nerve trunk itself that are affected. Sciatica has the same origin as radiculitis, though sometimes there may be other causes. In particular, it may be caused by a disease of some organ in the region of the small pelvis, for instance when women have a chronic process in the uterine appendages.

Treatment in such cases is almost similar to that for radiculitis. However, if it has been established that sciatica is caused by an inflammation of the uterine appendages, the patient should of course first be treated by a gynecologist. Otherwise a focus will remain that can cause exacerbation, local alterations, adhesions, and recurrent disease.

An observant patient with radiculitis once explained his case and then asked me:

"During the last year I have had pains in my back quite often. Sometimes it is enough to make an awkward turn for my back to get 'locked'. It is not as terrible as it used to be at first, and the pains are not so sharp, but there is considerable constraint of movement that lasts for a long time. Drugs bring little relief. But I have noticed that if I do not lie down at once, but start walking a bit very cautiously, this constraint gradually eases. Why is it that walking helps in this case?"

This is quite understandable: muscular tension relaxes more easily and gradually during movement, especially if the muscles that fix the position of the spine have not been under constant training. If the patient walked more, morning and evening, and if he performed a few physical exercises, he would probably have pains much less frequently or even not at all.

If you do not feel like doing physical exercises, just dance a bit. Put on a record with some rhythmic music and do some rapid dance steps for 3 to 5 minutes. It is good to do this twice a day: in the morning and before going to bed. But if you are already suffering from pains, you should not do this. It will only aggravate your condition.

What is the main cause of all these diseases—of radiculitis, sciatica, lumbago? What essential mistakes do we make? Changes due to age are not necessarily a disease and, as we know, not everybody suffers from radiculitis.

First of all, all parts of the body should be evenly developed. The way to radiculitis lies in the wrong distribution of motor activity, in the wrong "training" of muscles, and in many other factors. But my personal opinion is that our beds are the most common cause of radiculitis. Yes, this is just what I mean. A bed, with thick, springy and not too soft, mattress, and sometimes with a feather bed, which is so cosy. But it is just this kind of bed that does not allow the spine to straighten out sufficiently during the night. It does not allow the back muscles to fully relax, or the ligaments and joints to get a complete rest and regain their normal state after supporting a huge load all day. People who have not suffered from radiculitis (as yet!) should also sleep in another type of bed.

Let us dip into history. Alexei Tolstoy writes in his novel *Peter the Great*: "Peter lowered his thin feet from the bench..." This reveals that the Czar slept not in a bed, but on a wooden bench. Such a bench, or polaty, as it was called, was covered with some kind of mattress, so that it should not be too hard to sleep on, but usually not with a feather bed. For many centuries such a sleeping place with a mattress on top was the most popular type of bed in Russia (though the wives of merchants prefered softer beds). The mattress was filled with straw, seaweed, or softer material, according to the means of the owner. Did the people who slept on polaty suffer from radiculitis? Certainly less than those who slept on feather beds. Radiculitis is largely a "modern bed disease" caused by a soft mattress, soft pillows, and many springs.

What should the ideal bed be like? First of all it should be sufficiently hard. On no account does this mean that one should go from one extreme to another and sleep on bare boards covered only with a sheet. No good will come of this: certain muscles will be continually traumatized under the weight of the body. Note that in bygone days a mattress was always put on the polaty.

Experience shows that the most appropriate sleeping place consists of wooden planks 2 cm thick, nailed together into a solid board (but neither chip wood boards nor plywood should be used). The board must be the length of one's body and as wide as a normal bed. A 6-8 cm thick mattress that is sufficiently soft and resilient (for instance made of foam rubber; one filled with cotton wool is worse) should be placed on top of the board. Over this mattress one should spread a thin blanket, preferably a woolen one, and the blanket should be covered with a sheet. The pillow should not be too thick. At rest, the head and body should be approximately in line: there should be no sharp bends. This, strictly speaking, is all there is to the construction of the bed. But what can one do if one's bed already has a built-in mattress? Just put the board on top of it.

You will get used to such a bed in no time, and then you will not want to sleep on any other kind. I know this from personal experience. A functionally inadequate bed is one of the most common causes of radiculitis, and the older the person, the more often it affects him.

Of course, there is a multitude of other factors that promote radiculitis. Most of them can be foreseen and, consequently, the potential development of the disease can be prevented to a great extent. For instance, there is an ailment that is commonly known as "driver's disease".

The following happened years ago. A middle-aged man walked into my consulting room at the clinic where I worked. He moved with his body bent slightly forward from the waist; he took small steps, lifting his feet off the ground as little as possible, He walked very cautiously. He sat down carefully on the edge of a chair but did not lean back. He just sat there bent forward slightly.

"This is not the first time that I have driver's disease", he complained. "I've been a driver for almost twenty years and every year I get this two or three times. It used to be not so bad. I first got sick six years ago when my car was under repair. It was suspended over the pit. There was a draught there and one could not fully straighten oneself. I have suffered from this illness since then. I've tried everything."

Even before I started to examine him, it was clear that he suffered from radiculitis connected with osteochondrosis. His complaints were typical, as were the symptoms that became evident on examination. An X-ray of the spinal column revealed a lot of things. This was not some special driver's disease, though professional drivers probably do suffer from it more often than other people.

A driver sits in the driver's seat almost all day. And although he has a sedentary job, the body is in constant motion. The shoulder girdle moves all the time as the hands manipulate the steering wheel. The feet are also moving all the time: one has to step on the accelerator with the right foot, then move it to the brake, or let in the clutch with the left foot. The spinal column, though it appears to move very little, is also subject to great stress, especially the muscles that hold it in position. It is precisely the spine that is subject to a large, constant, static load. Frequently, during the long ride the driver may feel his or her back going numb! One wants to move away from the seat back and stretch. And this does help. At the same time a relatively immobile spinal column, constantly supported by the seat back, is often subject to sudden vertical loads, mainly as a result of bad roads and potholes. This means that these loads act on our shock-absorbers—the intervertebral disks—and on the ligamentous apparatus and the spinal muscles, which are sometimes unable to react in time to the abrupt jolts.

Of course, not every driver suffers from radiculitis. Some people have more durable intervertebral disks, ligaments, and muscles. But what about the drivers who suffer from frequent bouts of radiculitis? Does this mean that they should change their job? Well, this might well be the best solution in some cases, but one can also try to strengthen the spinal muscles by systematic remedial exercises, physical exercises, and conditioning. In this case the disease quite often disappears. But these are not the only measures.

Radiculitis is largely induced by the wrong position of the spinal column with respect to the back of the driving seat. It is very difficult, almost impossible in fact, to design a universal seat back that would be in strict conformity with the individual flexures of different drivers. All of us are different: we are of different height, we have different proportions between the various parts of the spine, and the natural (and so necessary) spinal flexures are pronounced to various degrees in different people. But one can make a very simple and very effective contrivance, which I often recommend to drivers.

With some soft material (foam or sponge rubber) make a small bolster that is 10-12 cm wide: one side should be flat, and the other, slightly convex. The most protuberant part should be 4-6 cm thick, and the bolster should be slightly shorter than the width of the seat back. This bolster should be covered with fabric and its ends should be connected by a wide elastic band. It should be slipped over the seat back with the sloping side facing outward and the elastic band passing behind the seat. This will keep the bolster tightly in place and allow it to be moved up or down in accordance with the position of each driver's lumbar plexus.

Many drivers experience no more back pains after they start using this simple contrivance. They stop going to the doctor's so frequently, and in some cases, they no longer require a doctor's help. Non-professional drivers will also find this contrivance useful.

Not only drivers suffer from radiculitis. People in other professions, e.g. builders, shop-assistants, metal-workers, even doctors, suffer from it.

How can radiculitis be prevented? The preventive measures have already been mentioned. They include the balanced development of all the parts of the body through physical exercises, an appropriate bed, and the ability to distribute motor activity correctly. For instance, the right way to carry heavy loads is to divide them: it is better to carry 8 kg in each hand than 16 kg in one. There is a smaller chance of getting radiculitis in the first case. For people who suffer from metabolism disturbances and pains in the joints of whatever origin, it is very important to keep to a proper diet prescribed by a doctor. Everybody should understand this, as well as the fact that there can be no universal treatment suitable for everyone.

I would like to warn you against self-treatment once again. In the case of radiculitis, this can also be very dangerous. The uncontrolled use of drugs, even "harmless" ones, is often fraught with new, very grave consequences. Especially when one suffers from radiculitis for the first time and should definitely be examined by a doctor. There are cases when radiculitis may be a secondary manifestation, i.e. a symptom of some other disease such as tuberculous spine, serious injury, even tumors, and several other less common diseases (occurring in children as a rule, but less frequently in adults).

And now let us discuss some ways of preventing an acute attack of radiculitis, as well as ways of treating it in cases where the diagnosis is beyond question and the form of the disease is mild. If your bed is already quipped with a board as described earlier, you can considerably increase its effectiveness by inclining it. For this purpose, the head of the bed should be raised by placing no more than two bricks under its legs. Next, make two thin bolsters out of gauze, each half a meter in length, and stuff them lightly with cotton wool. They are made into long loops that are secured to the headrest in such a manner that by thrusting one's arms up to the armpits through these loops one should be able to lie in a normal position on the bed. The distance between the points of securement of these two loops to the headrest should be 10 cm greater than the distance between one's armpits.

In this way, while sleeping on your back, you hang, as it were, on the inclined plane of the bed. During the night, the spinal column will gradually relax under the weight of the body; the intervertebral disks, ligaments and muscles will also get more relief.

But do not on any account raise the head of the bed higher! Otherwise you may injure yourself by exceeding the permissible loads. And it is inadmissible to attach, in addition, a load to your feet. This is not at all necessary, because the weight of the body is quite sufficient. Such loads are used only in hospitals, and only with a special apparatus that can be precisely regulated.

I have already mentioned several times that for preventing and treating radiculitis it is necessary to do physical exercises. But is there any special athletic equipment that can be set up and used at home? Of course there is. First, I would recommend a horizontal bar. It is easy to erect one even in the doorway: special strong fastenings are made, and a removable metal rod, usually an aluminium tube of appropriate diameter, is secured in them. There is not one exercise on this apparatus that is contraindicated for radiculitis, or for the prevention of it. Even just an attempt to pull yourself up or to hang by your hands will already do some good. It is also good to perform exercises on wall-bars. They are described in every manual, but it is more difficult to set up such an apparatus at home.

Dumb-bells or weights, even if they are

not very heavy, should on no account be lifted without first consulting a doctor.

One can also do push-ups from the floor, but prudently, within reasonable limits, without overstraining and getting too tired.

Jogging and other forms of running are very popular today. In general they are not detrimental to the prophylaxis of radiculitis, but here again, a doctor should first be consulted. Any form of running is a considerable strain on the spinal column. Conditioning should be carried out correctly, and the amount strictly regulated.

I had a patient who practically wore himself out by jogging, provoking, as a result, a sharp exacerbation of his illness. Another patient preferred skipping, because he did not fancy running in the street. He practiced with a jump-rope both in the morning and before going to bed, and always for a long time, almost to exhaustion. As a result, he also experienced severe exacerbation of his illness. In general, one should do everything in moderation.

Many patients claim that the skin or the fur of certain animals, for example, lambswool or the fur of a dog or rabbit, tied across the small of the back helps them when they get radiculitis. Others tie woollen shawls or something similar around their waists. This is really quite sound practice. Naturally, it is not important what fur is used, but it is the principle as such that is important. Special therapeutic underwear is also available. Woollen elastic belts of various sizes are sold at the drugstore. All these measures are of value and prove useful in many cases, though mostly as preventive measures.

But I have encountered several times a form of self-treatment involving a belt woven from strands of thin copper wire, or large copper coins stuck onto the skin with adhesive tape. One patient even showed me a copper bracelet that he wore, on his ankle to "cure" radiculitis. I am afraid I must disillusion such gullible people: such measures have no effect. I have never known them to bring any relief.

However, a sauna—the Finnish-style steam bath that has become so popular of late—can have quite a beneficial effect on radiculitis, because it helps to eliminate excess water from the body, to reduce the oedemas that compress the nerve fibres. Doctors often prescribe special medicines just for this purpose.

The following is a recipe for an absolutely harmless folk remedy that I came across in a very old book. Wash well some parsley leaves and roots, and grind them in a meat grinder. Put exactly one cup of the minced parsley into a glass, china, or enamel dish, and pour two glasses of boiling water over it. Cover the dish with a thick cloth (a folded towel, for instance) and leave it till morning. According to the recipe, all these procedures should be done in the evening. In the morning, strain the infusion through three or four layers of gauze and squeeze out the solid mass. Add the juice of one lemon, and the drink is ready. Not more than one-third of a glass should be taken daily. It should be taken for two days in a row, followed by a three-day break; then this is repeated. There seem to be no contraindications. In bygone days, this remedy was widely used for eliminating various oedemas, both of the feet and of the face. It is also good for radiculitis.

There are many ways of relieving pain by local skin irritation. There are many special ointments, some of which contain bee or snake venom, Vietnamese ointment, and many others. The pharmacist can make up the intensely burning Rosenthal's paste according to a doctor's prescription. Finally, one can treat oneself with a capsicum plaster, but this should be done with caution if one has tender skin. All these procedures help to alleviate pain.

However, the relief of pain is not a cure in itself. One should always be under a doctor's supervision, and one should not consult so called "knowledgeable" people for advise. Every person's experience is a strictly individual thing, whereas a doctor has the professional knowledge and wide experience that are acquired through treating of many patients. Most importantly, a doctor will always warn you against doing certain things that are specifically harmful in your case, so as not to aggravate your condition, and so as not to acquire a second, treatment-caused disease. Unfortunately, such things happen when patients undergo self-treatment.

If the pain is very bad, a procaine blockade is often induced. Such a blockade is carried out in various ways and has different effects. For instance, an intracutaneous blockade results in areas on the skin that resemble the peel of a lemon. Nerve endings in these areas temporarily lose their sensitivity. This measure helps, and sometimes has a long-lasting effect. A blockade may also be induced at the site where the nerve fibres emerge from the intervertebral space, at the sites of autonomous and sympathetic ganglia, etc. In these cases, the transmission of pain impulses along the nerve is blocked and the tensing of the muscles ceases. The patient always starts to feel better immediately. At the same time, another property of procaine takes effect, i.e. it reduces local oedema. All these measures can be carried out only at a hospital, or, in rarer instances, at an outpatient clinic.

In addition to the already described measures there are quite a lot of other methods for treating various forms of radiculitis, lumbago, and sciatica. Among them are physiotherapy, which includes various electrotherapeutic and hydrotherapeutic procedures, remedial exercises and massage, and balneology, which includes climatotherapy at health resorts, sea bathing, mudtherapy, salt water baths, and many other procedures.

In some cases, where all these measures have proved ineffective, the only alternative is surgery: an operation that restores the vertebrae to their proper position, thus eliminating traumatic action on the nerve roots.

Testing for Strength

Traumatic Lesions of the Nervous System

I keep a real human skull at home. It has been polished by the hands of all the students who studied before and after me, because I lend it to my acquaintances when they need it for their studies. I hope that people who have never had any professional connection with medicine, and to whom the sight of a skull is frightening, will understand why I keep it. Even now I often scrutinize it to gain a better understanding of a number of relationships. How often this helps in the diagnosis of nervous diseases! The skull has an extremely complex structure. A lot of time is needed to memorize all of its most minute details, including the various protuberances and depressions, openings and small canals, and the enormous number of sutures that unite the different bones into a single structure. It is also necessary to know the location of blood vessels and nerves, as well as their smallest branches, but the most difficult thing is to understand the structure of the temporal bone.

The skull is a very tough structure. Even the forces of nature cannot easily destroy it. Archeologists have dug up the skulls of our ancestors who lived over half a million years ago.

The skull is a real fortress. But why has nature taken such pains to make this structure in particular so strong? Obviously, this is because the skull is the repository of the main complex that ensures life, ensures the perception of all possible information from the external medium and from every part of the body, and makes it possible to exist in the environment. But, unfortunately, this fortress is not really so impregnable, although nature has done its best to fortify it.

Its weak links are the pathways that connect the structures within the "fortress" with the outer world and with the rest of the body. To function continuously the brain needs to be supplied with oxygen all the time. Infection in the form of viruses and bacteria, which are the causative agents of a number of inflammatory diseases, can sometimes penetrate into the brain with the blood that carries the oxygen.

Perhaps most often it is the head that suffers from injuries. Evidently this is why nature has tried to make the skull so solid. I am sure everybody can recall several injuries involving the head that they sustained in childhood and in later years. There are the falls during the period when a child is learning to walk, and contusions of the head during outdoor games. One can hurt one's head just tripping. How many people slip and fall, or hit their head against a low lintel! There are countless dangers. It is not for nothing that workers have to wear a protective helmet on all building sites. A helmet is also compulsory for all motorcyclists. Some injuries are so severe that the bones of the skull are unable to withstand the impact: they crack or even splinter into many fragments. Fortunately, major injuries with fatal outcomes are rare. Minor injuries or moderately severe ones are more common.

The outcome of the injury, however, does not always depend on its severity. I know people who sustained extremely severe brain injuries, called penetrating wounds, during World War II. These injuries occur when a mine fragment or shell splinter, or sometimes a spent bullet, pierces the bone of the skull and lodges in the brain, sometimes quite deeply, having damaged considerable areas of the brain along its route. Some of these people are still working at full capacity today and are not too inconvenienced by the complications caused by the injury. But such cases are the exception, of course. Unfortunately, most people with this kind of wound die.

Sometimes a seemingly inconsequential event, such as hitting one's head against a door lintel, or slipping on ice and striking the back of one's head, can have very deplorable results. One may not even lose consciousness, but may just feel a bit dizzy or "see stars", and then feel all right afterwards. However, some time later one will begin to feel unwell and the doctor may explain that this seemingly trivial injury has had grave aftereffects. Why does this happen?

A lot of factors determine the result of an injury. They include the force of the blow, the part of the head that is injured, the state of the person's vascular system, and the person's age, of course. There are many other factors that on face value seem "inconsequential", but prove just as decisive.

But the reader may ask whether or not there exist certain regular features that help doctors to establish the type of cranial injury and determine its severity.

Such features do of course exist. First, all head injuries are divided into open and closed ones. Since the brain also suffers in every injury to the skull, such injuries are called craniocerebral ones.

A closed craniocerebral injury is an injury when the bones of the skull remain intact, even if the soft tissues are damaged, the skin ruptured, and there is bleeding. An open craniocerebral injury means that the bone is damaged. In addition, open craniocerebral injuries are subdivided into two large groups: nonpenetrating injuries (with the meninges remaining intact) and penetrating ones (with the meninges damaged).

Severe cranial injury almost always involves brain damage. If a person has sustained a cranial injury without the slightest signs of brain damage, this means that it was just a contusion of the head. If in the case of a closed cranial injury there are signs of brain damage, then the diagnosis is concussion of the brain. But concussions may be of various degrees of severity. There may be mild, moderately severe, and very severe concussions. These gradations are sufficiently distinct and are determined by the gravity of the aftereffects of the brain injury. For instance, if the injury is followed by a brief loss of consciousness, vomiting and nausea (or any one of these symptoms), it is considered a mild concussion of the brain. There may be various minor signs of damage to the nervous system, but they soon gradually disappear.

With a moderately severe concussion of the brain the unconscious state lasts longer: sometimes from a few hours up to several days. Vomiting is a more permanent symptom. The signs of damage to separate areas of the brain are more pronounced. These symptoms disappear much more slowly after the injury, and not always completely. But there is one main guiding symptom: the patients cannot remember any events that took place just before the injury. Doctors call this phenomenon retrograde amnesia.

A severe concussion of the brain means very serious damage to the brain, to its vital centres that control the activity of the cardiovascular system, respiration, etc.

But why does this happen? Here we have cases where the skull remains intact, which means that there should be reliable protection for the brain. In fact, the bones of the skull do remain intact, but the cerebral vessels become injured, and sometimes very severely.

One must remember that the brain is in a way suspended in the cerebrospinal fluid, which, naturally, cushions the blow. But only to a certain extent. The blood vessels and nerves run to and from the brain through the meninges and this cerebrospinal fluid. At the base of the skull there is a bony structure called the Turkish saddle. An extremely important endocrine organ—the pituitary body (or gland)—is immured inside this structure. The pituitary gland is connected with the rest of the brain by a short round cord called the infundibulum because of its funnel-like shape. The most important nerves and blood vessels run through the infundibulum.

Now just imagine what happens when the head sustains an injury, especially if it is an unexpected, abrupt one. Either the shock-absorbing system has no time to get into action, or the blow proves to be too strong for the shock-absorbing capacity of this system. The brain undergoes a sharp displacement. The blood vessels are abruptly stretched and twisted, and become injured as a result. The infundibulum is also injured. Naturally, such a shake-up does not ignore the brain itself; here there are a lot of vascular disturbances. Quite often there are punctate or larger meningeal haemorrhages.

This is why a severe concussion of the brain is very dangerous, even if the bones of the head remain undamaged. If the blow to the head is strong, the brain may be dashed against the inner surface of the skull. At the site of the contusion, the blood supply is disturbed and various types of haemorrhages occur. This part of the brain may perish. The brain may not be damaged exactly at the site of the injury, on that side of the head. Quite often it is the opposite side of the brain that suffers as a result of the impact of the countershock that develops in accordance with the laws of hydrodynamics. A severe contusion of the brain can often prove fatal. Sometimes a person becomes a paralyzed invalid; sometimes he or she suffers from mental disorders. In general, any craniocerebral injury is a serious disease, the results of which are not always predictable.

Because of these serious consequences, one should immediately consult a doctor after any cranial injury, independent of its severity. This should be done in every case, and at once, the quicker the better. Only a doctor can competently assess the severity of the injury, carry out a proper examination of the patient, and take all the necessary measures for effective treatment.

Naturally, this does not concern slight contusions, which one may suffer on inadvertently hitting one's head against a doorframe. But if the blow is hard or if any unpleasant sensations occur after it, consult a doctor at once. The appearance of even the slightest signs of a concussion (nausea, dizziness, etc.) are even more reason to seek medical aid. If the injury is even more severe, the patient should lie down, and a doctor, or even an ambulance, should be called. The diagnosis and treatment of head injuries have been quite thoroughly studied, and the best results are obtained if treatment is begun at an early stage.

Here a word of warning should be included. People who have suffered a head injury and a concussion of the brain often start breaking their regime as soon as they feel a bit better. Still feeling far from well, they leave their bed before they should in the hope that everything will somehow come out all right in the end. But such injuries are not that simple. For example, an injury of the head is often accompanied by small, punctate haemorrhages; in addition, there are often signs of haemorrhages in the cerebrospinal fluid. But in some cases the branches of large meningeal blood vessels are also damaged. Blood collects in restricted spaces either between the bones of the cranial vault and the dura mater, or between the latter and the brain matter, and slowly begins to exert pressure on the brain. Such accumulations of blood are called haematomas. A haematoma consisting of 100 grams of blood is sufficient to evoke extremely severe symptoms of the disease. These do not become immediately evident after the injury, but after some time, usually during the first three days after it, or even later, after two or three weeks.

It is clear that if the patient does not obey the doctor's orders and does not keep to the prescribed regime, there are greater chances that such complications will occur. In such cases there is only one remedy, i.e. urgent neurosurgery. Statistics reveal that such haematomas occur in 0.5% of every 100 cases of acute craniocerebral injury. This is a very high percentage.

Naturally, one may ask: What about children? How do they withstand craniocerebral injuries? They experience them much more often than grown-ups, of course, and their skull bones are not yet as strong as those of adults, because their skulls must still grow. Does this mean that injuries of the head are more dangerous for children than for grown-ups?

Parents need not worry. As a rule, children get over cranial injuries much more easily than grown-ups. Even when there is a depressed fracture of the cranial vault and there is a depression on the child's head that may sometimes be quite large, timely treatment leads to complete recovery in most cases. How do cranial injuries in children differ from those in adults?

Children's skulls are not as solid as those of adults, the bones are thinner, and in early childhood they still preserve a certain resiliency. Babies have cranial fontanels, as everybody knows. And, finally, children have a much greater layer of cerebrospinal fluid around the brain. All these factors help to cushion the blow, to lessen the damage to the brain matter and cerebral blood vessels, which are also much more resilient than those of grown-ups. In addition, the brain, cerebral vessels, and skull of a child are in a state of continuous development. Because of this, all the disturbed functions return to normal quicker and more fully. However, children can also experience severe craniocerebral injuries with grave consequences.

It is often extremely difficult to diagnose a craniocerebral injury in a child and to evaluate the child's condition. Sometimes the child does not remember any injury, or it escapes the patient's memory as a result of retrograde amnesia. Certainly, bruises on the head and external haematomas help to make a diagnosis, but it is not always an easy matter to discover these bruises. In addition not every cranial injury leaves bruises on the head. Sometimes it is not easy to decide whether a child is unconscious or just asleep. It is always more difficult to examine a child than an adult patient. And, of course, if the child has sustained an injury of the head, one must take all the above-mentioned precautions.

As for the remote effects of a craniocerebral injury, i.e. effects that become evident several years or more after the injury, they may be of various nature. It must be repeated that the severity of the acute stage of the injury and the nature of its consequences are determined by a host of factors. If treatment is begun in time, and the patient adheres strictly to the doctor's orders, all the disturbances may disappear and the patient may recover completely. In other cases, there may be periodical headaches. If the injury is extremely serious, the consequences may be more tragic: they may limit the working capacity of the patient or even cause disablement.

Are there ways to help patients who experienced a head injury a long time ago and now suffer from the consequences? There are, and they should be used. But perhaps it is the patients themselves who can help most in such cases. In the first place they must organize their lives so as to avoid everything that might aggravate their condition. Practically all the measures to be observed in cases of craniocerebral injury were described in the chapter that discussed the prevention and treatment of headaches. Here also one should avoid overheating and overcooling; exposure to the sun should be limited (independent of whether the weather is hot or cool); meals should be taken at regular times; alcoholic drinks excluded completely, the salt intake restricted in food; and, finally, physical exertion should be avoided. The medical recommendations for many diseases of the nervous system are similar in many ways, though not completely identical. This is because the same mechanisms are involved in various diseases of the nervous system, though they are triggered by different factors.

And finally, in addition to these general recommendations one should, of course, adhere strictly to the doctor's orders.

Up to now we have discussed injuries resulting from accidents, i.e. injuries that are not always possible to avoid. But there are situations in which head injuries, and very serious ones, are completely unavoidable, where they occur frequently and are not dictated by chance. I am speaking of boxing. This is why I am against boxing, and I am sure that I am not alone in this. In some countries boxing has been outlawed.

What is a knockdown? Why does the referee stop the match at once and start counting down? What does he base his judgement on? The point is that a knockdown is a comparatively mild concussion of the brain. It is not for nothing that a boxer who has been knocked suffers involuntary movements of the eyeballs (a phenomenon that neurologists call a nystagmus). The referee counts down untill the moment when these involuntary movements of the eyeballs cease. Only then does he give the sign to recommence fighting.

And what about a knockout—that symbol of absolute victory in boxing? It is quite a severe concussion, but in addition, it is a contusion of the brain, or, to be more exact, of its base. And there is loss of consciousness, even though only for a brief spell. It is exactly at the base of the brain where the vital regulatory centres are situated. Brain injuries do not produce immunity to future injuries. Quite the opposite, each previous injury makes the subsequent ones more dangerous. Finally, one reaches a stage when even the slightest injury can cause loss of consciousness, because this trivial injury involves an already severely damaged part of the brain that has been deprived of most of its natural defences.

This is not an exaggeration. If you pick up a skull and imagine that the brain is inside it, you will see that an uppercut will involve exactly the base of the brain. This is the place where the pituitary gland is situated, as well as the infundibulum that connects it with the brain; and here are also the base of the cerebral hemispheres and the so-called brain stem, which contains the vital centres. The blow affects the cerebral vessels and the meninges. All this is accompanied by contusion of the brain and small, punctate haemorrhages in the meninges and the brain itself.

Possibly I have a somewhat biased attitude towards boxing as a result of personal experience. During World War II after severe wounding, I spent a long time in a hospital that was very laconically and expressively called “Head”. One can surmise that it was a hospital for soldiers with head wounds. As a result already then, as a youth of nineteen and not yet a doctor, I saw a lot of different cranial injuries. I believe that my stay at this hospital played a decisive role in the choice of my future profession.

Unfortunately, boxing is not the only situation in which the head gets injured if not deliberately, then at least not quite by accident. The following are several examples.

About two years ago a patient came to consult me. He was 30 years old, and a constructor by profession. He came with his wife. His complaint was a very common one: he suffered from headaches. But his wife (it was she who volunteered most of the information) had noticed, already some time ago, that her husband’s headaches always got abruptly worse when the weather became warmer, when her husband had the flu, or when he just got overheated. “He cannot vacation in the south; he never sunbathes even in the temperate zone: the slightest heat at once causes headaches.” Then she told me that her husband first began to suffer from headaches about five years ago, after the following event. There was a party at his office. The employees were celebrating something and had had some drinks. One of her husband's colleagues, a confirmed joker, pulled the chair out from under her husband, who fell and struck his coccyx hard on the floor. The place hurt for a long time after that, for about three weeks.

"Did he lose consciousness?"

"I do not think so... But they were already a bit tipsy... Next morning he had a headache. He even had to go on sick-leave. We thought it was a hangover..."

I examined the reticent husband. He showed symptoms of a slight impairment of the functions of the nervous system. A check-up at the eye specialist, an X-ray of the head and an encephalogram confirmed my suspicions. His symptoms were the aftereffects of concussion of the brain, and one that had not been treated.

It is not such a rare thing for a blow on the coccyx to result in concussion of the brain. The effect of the blow is transferred through the spinal column to the brain. I am still treating this man. He feels much better now, but he has not been able to get completely rid of his headaches. To think that all this resulted because of a joke played on him by his slightly tight colleague! I do hope that when the joker sobered up, he at least realized what a silly joke it was.

There is a quite popular game that involves the following: the central figure in this game turns his back, rests his chin in his left hand and places his right hand under his left elbow, palm facing outward, with the back of the hand pressed to the elbow. One of the other players strikes him on the palm of this hand; he turns round, sees that everybody has their thumbs up, and is supposed to guess who struck him. Let us put aside the question of the level of intelligence for which this game is intended. Just recall how people usally strike the victim? Not everyone strikes lightly and playfully. Some try to give a sharp blow, to hit with all their force. Why do they do this? Sometimes such a game can also cause concussion of the brain.

I once witnessed another unhappy event. Some young people—students—were romping around, playing blind-man's-buff. The "blind man" was a strong young chap who rushed abruptly in various directions in response to the shouts of the girls who egged him on. Then one of the girls called to him from behind the trunk of a very big tree. The young man opened his arms wide, put his head down and rushed at the tree, literally driving his head into it. He did not lose consciousness, but he broke his head and there was a lot of blood. Afterwards he sat under that very tree for a long time, holding his head. And the girl who was to blame, with eyes lowered, changed the compresses on his forehead. Did the boy get off with no harm done? Maybe he did, and maybe he did not. The blow was a terrible one.

Humans are fragile beings. Our health, and sometimes our life, depends on chance. Let's be more considerate towards each other in such situations.

Spinal injuries occur more rarely than cranial injuries, but they have definitely more dramatic results. It is more correct to call such injuries cerebrospinal ones, because in these cases the spinal cord, its membranes, and the nerves running from it almost always suffer too.

As in head injuries, there are open spinal injuries, with the skin being broken, and closed ones, with the skin remaining intact. Also such injuries are subdivided into penetrating ones, with the wall of the vertebral canal being damaged, and non-penetrating ones. We shall not discuss open injuries of the spine. They are usually the result of various wounds and are rarely seen. We will discuss the injuries that happen most often in everyday life, i.e. closed injuries: contusions and fractures of the spine, and ruptures, strains, and even dislocations of the spinal ligaments.

A brief description of the structure of the vertebral column was presented when we discussed radiculitis. Here, I would only like to remind the reader that every vertebra has a ring. These rings form a canal along the whole length of the spine, and in this canal lies the spinal cord. The upper boundary of the spinal cord is a very relative one, since here it merges with the brain. Because of this, it is assumed that the boundary lies between the great foramen of the skull and the first cerebral vertebra. In adults, the lowest part of the spinal cord lies on the level of the second lumbar vertebra. Here the cord becomes narrower and its tapered conical end is called the medullary cone. Below this level, spinal roots run down through the spinal canal, forming the so-called "horses tail."

The spinal cord reminds me of a tightly braided plait, with spinal roots running from its lateral surfaces at each vertebral level. These spinal roots, after passing through the thick membranes of the spinal cord, run to a specific intervertebral space, where they join into common bundles—the funiculi. The anterior roots conduct motor impulses; the posterior ones, sensory impulses.

Most of the spinal cord belongs to the central nervous system and, like the brain, has a very complicated and highly developed vascular system. The blood vessels, like the spinal roots, pass through the intervertebral spaces. The spinal cord, like the brain, is also immersed in cerebrospinal fluid, which surrounds it at every level.

The cerebrospinal fluid is produced by special glands located in the medullary cavities. On being released by these glands it passes through the respective openings and canals and reaches the surface of the brain. It continuously bathes the surface of the brain, then passes down along the surface of the spinal cord and is gradually absorbed into the venous system.

The spinal cord is made up of many thousands of nerve fibres and vessels of various sizes. And with all this, the spinal cord of an adult is no thicker than the little finger of a seven-year-old child. The whole spinal cord is arbitrarily divided into segments strictly corresponding to the number of vertebrae in the human spinal column. The boundaries between the segments are marked by the sites where the spinal roots run from the spinal cord.

Inside the spinal cord, there are groups of evenly distributed motor and sensory cells that run on both sides of it all along its length. Nerve fibres from the brain end either on these cells or near them. And nerve fibres run from the latter to the peripheral parts of the body, to all its organs, literally to the tips of our fingers. There are two areas of the spinal cord where there is a maximal concentration of such cells: the lower cervical—upper thoracic, and the lower thoracic parts of the spinal cord, from which the nerve fibres run respectively to the hands and the feet. The places where these cells are concentrated can be seen with the naked eye as slight bulges in the spinal cord.

Suppose the injury has occurred on the boundary between the cervical and thoracic spines. A vertebra has been fractured, and its splinters have cut or compressed the spinal cord just at this point. What will happen? Complete paralysis will result. The patient won't be able to move hand or foot. Sensation will also be disturbed. Besides, the functions of internal organs will also be affected, urination impaired. There will be retention of stool and trophic disturbances that will cause bedsores. This is because the nerve fibres not only conduct sensory and motor impulses; they also ensure trophicity, i.e. local metabolic processes, the blood supply—in a word, tissue nutrition. When all these processes are disturbed, trophic ulcers develop, and quite often they are complicated by local infections.

There will be more or less the same picture if the spinal column is injured at lower levels, i.e. the same paralysis, the same disturbance of sensation. In this case, however, all these things will happen in the part of the body that lies below the level of the verbebra or vertebrae that have been fractured.

When there is a closed injury of the spine there may even be no skin damage. The vertebrae themselves do not fracture as easily, especially the "body" of the vertebra, i.e. the most massive and solid part. It is usually the more fragile bones, which form the walls of the cerebrospinal canal, that get broken. The spinal cord, though very small in diameter, is also not completely damaged all the way through; usually only a small part suffers. But not only direct damage of the spinal cord leads to disturbances in its functioning. The same effect can result from the injury of a blood vessel supplying a certain area of the cord, or from a haematoma in the cord itself or in the spinal canal. The diameter of the spinal cord is so small that a haematoma less than a pea in size is enough to completely compress it. In this case there will be the same symptoms as in injury of the spinal cord.

A severe contusion, even without any damage to the vertebrae, can also result in the same symptoms.

Injury of the spine can be caused both by a blow on the spine, i.e. an external impact (a log falls across your back or you fall across the same log), and by falling or landing on your feet badly when jumping from a height. Even dancing can lead to the dislocation of a vertebra. However, in some of the cases (when there is no direct external mechanical impact on the spinal column) there may be a certain predisposition due to pathologies that are either hereditary (fragile vertebral bones, insufficient development of the muscles of the back, weak ligamentous apparatus) or acquired (tumours of the vertebrae, changes caused by inflammation, osteomyelitis). Thus, the results of an injury are not always directly proportional to its severity, its force, or the extent of vertebral damage. In addition to the external causes of injury, changes that have occurred in the body and the spinal column that sustain the various injuries are also of great consequence. The combination of these factors determines the final result of a cerebrospinal injury.

Here are some examples from my own practice.

In the mid-sixties, a new dance—the twist—had just become the fashion. Everybody seemed to be "twisting"; in this dance the body twists spirally in time to the music, and then bends sharply backwards in an arc. The best dancers were those that could bend back so far as to touch the floor with their head and then, still twisting, straighten up again and continue dancing. It is a beautiful, athletic dance. A friend of mine phoned me at six in the morning.

"Please forgive me for ringing up at such an ungodly hour," he said, "but there has been an accident. Something has happened to the 'captain's daughter'."

The "captain's daughter" was Vera—a very beautiful, slender, brown-haired girl of twenty-five. She really was the daughter of a captain, and she and my friend were just about to get married. Vera had a good temper; she was always in a sunny mood. She adored dancing and danced superbly.

When I entered the room, Vera was lying on the sofa. She tried to smile at me. When I asked her what had happened, this is what she told me:

"I decided to dance a bit before bed. I put on a twist record and began twisting. I do this every day. While dancing, I bent sharply backwards and to the right. I had often done this before and usually my hair almost touched the floor, but this time I felt something crunch in my back, and at the same time I felt as if a knife had been driven into that spot. I even screamed. I don't remember how I reached the sofa and rang up Victor. It still hurts, but not as much as then. I'm afraid even to turn on my side."

But I was obliged to turn her on her side. I noticed that the muscles of the back were very tense. One had the impression that the spinous processes of the sixth and seventh thoracic vertebrae stuck out a bit and looked as if they were slightly displaced with respect to one another. There were certain disturbances of sensation that corresponded to just that level of the spinal roots. The knee-jerk reflex was slightly enhanced. The clinical picture clearly indicated a subluxation of the spinal column. It was necessary to carry out a more thorough examination and to take an X-ray. And, of course, she needed to be hospitalized.

Vera spent about two months in the hospital. I still see her from time to time. She has a daughter, who is already quite a big girl, and a three-year-old son. They often dance together. She still loves dancing.

"Now I regard dancing as a nice form of exercise therapy," she told me, "but I never overdo it..."

There are other cases, such as the following, which have a much more tragic ending.

Alyosha is now twenty two. He has been bedridden already for a year. Now things are a bit better. He can sit up in bed without help, lower his feet to the floor and (with difficulty, to tell the truth) transfer himself to a wheel-chair, in which he rides around the hospital unit. A long period of treatment lies ahead, and a trip to the resort Saki. I hope he will be able to walk, at least on crutches at first. But even this will be luck after what happened to him. Alyosha knows this. He is studying a foreign language very diligently and hopes to become a translater of foreign literature. He is also learning to type.

But what happened to Alyosha? He had a serene and happy childhood and youth, and then he became a student. In his third year at the State Institute of Theatrical Art he passed his exams and was suddenly offered one of the leading parts in a film. The film was shot quickly, and a year later it was released. And at once Alyosha started getting other offers. But he did not labour under any delusions: he understood that success in one's first film might largely have been a matter of chance.

In the autumn, at the beginning of the new academic year, the students got together and threw a party. It was all very jolly, everybody joked a lot. They did not drink much and what they drank was mostly dry wine. Alyosha went out onto the balcony to smoke. It was day break. Below the balcony the grey, wilted autumn grass pushed up through the cracks in the pavement. He wanted to put the pack of cigarettes into his pocket but suddenly he dropped them, and they fell to the ground. The balcony was a low one: the top rail was not more than two meters above the ground. It would be easy to jump down and then pull oneself back onto the balcony. Nobody would be the wiser.

Alyosha climbed over the railing of the balcony and, holding on to it, jumped carefully down onto the asphalt. He landed neatly on his feet. But suddenly, for no apparent reason, his feet folded under him and he fell. One of his friends saw it happen. At once all the other students started jumping over the same railing onto the street. And nobody got hurt. Only Alyosha lay there, quite at a loss, pale and with a very apologetic expression on his face. An ambulance was called at once, and Alyosha was taken straight to the neurosurgical department of one of the Moscow hospitals.

There are sometimes surprising coincidences! I happened to know well both Alyosha and his family, and the doctor who examined him at the hospital and did all the preoperative investigations. The doctor who performed the operation, and an old friend of mine, told me afterwards:

"We took an X-ray at once, because the clinical picture indicated spinal cord injury in the lower thoracic spine. We discovered that there was a complex comminuted fracture of a vertebra with one of the bone fragments pushed straight into the cerebrospinal canal. There was no time to be lost, and we started to operate at once. We found the ill-fated bone fragment, which had bitten into the edge of the spinal cord. There was also a small haemorrhage. We were able to fix the vertebra and remove the bone splinter, but the spinal cord had been damaged. The patient was placed in a special bed and put under traction. We have taken all possible measures. Now we can only wait and see.

Indeed, after such an injury, only time will show to what extent the patient will recover.

Naturally, the question arises: Why did this happen only to Alyosha? The others had jumped from the same height. Incidently, the height was not great, people often jump from greater heights and are not injured.

It was established during the operation that Alyosha's vertebrae had a rather unusual structure. This was probably the main, although not the only, reason for the injury. Unfortunately, Alyosha did not like sports. If his back muscles had been trained and well-developed, all this might not have happened. He could not have foreseen, of course, that the jump would have such results. People with well-trained bodies are much better protected in such cases. The point is that physical exercises and sports not only make the muscular and ligamentous apparatus stronger; they also have a beneficial effect on the whole organism. The bones become much stronger and more durable. Sportsmen almost never have spontaneous fractures, i.e. fractures for no visible reason.

The described case can, to some extent, be ascribed to coincidence. But there are other, more frequent causes of such injuries, even in people with perfectly normal spinal columns.

The case that I am going to tell you about happened long ago, before the famous Uchinskoye reservoir had been built. At that time the river Ucha was simply a small river near Moscow, and we boys used to romp on its banks in the summer. It had its underwater holes, sandbars, and snags from which it was so convenient to dive. We knew from what side to dive so as not to strike our heads hard on the sandy bottom.

Once I dived wide of the mark, and instead of going into deep water, I struck my head on the sandy bottom. It was lucky that I didn't hit a stone, or a snag. There was ringing in my ears for quite some time afterwards. But what especially surprised me at the time was the fact that it was not my head that hurt most and for the longest time, but my neck. My playfellows told me: "You've sprained your neck. It's all right, it will pass." And so it did. A few days later I was again diving with them, but I was probably a bit more cautious.

Whenever I examine patients who have not been so lucky, I always remember this episode from my distant childhood.

Sportsmen hardly ever suffer such injuries. They know how to dive, and where one may dive and where one shouldn't. But there are people for whom the words "reasonable caution" have no meaning. The fact that they know nothing of the surrounding country does not deter them. Flinging off their clothes they take a running dive into the water. Such people may dive off a precipice, or off an overhanging tree. Quite often they are drunk to boot.

A person who while diving hits his head on some obstacle, especially a hard one, takes a great risk. He risks suffering a concussion of the brain, losing consciousness, instantly choking in the water, and drowning. That is a common outcome. He also risks breaking his cervical vertebrae. It is usually the two lower ones, i.e. the fifth and the sixth, that get broken. This means that he will be instantly paralyzed, with all the consequences and the very uncertain chance of recovering.

This is why you should never dive in a place that you do not know well. You should dive only in the places where there is a special diving board and the water is deep enough.

There are also too dashing skiers who take jumps from the ski jump. It looks beautiful when a trained sportsman jumps from a ski jump. He sails through the air like a bird, controlling his flight. It sometimes looks so easy: you only need to put on a pair of skis and give it a try. Actually it is a great art, and like every art, it requires a lot of coaching, assiduous training, and great willpower and skill. It is a great skill that gives the illusion of ease.

Some "bold spirits", who do not understand this, attempt to execute the same jumps. This often has a tragic ending. At the moment of landing such an amateur has neither the time, nor the ability to tuck properly, and may be flung sideways or turned head over heels. It is often the same cervical vertebrae that get damaged in such cases, and with the same results.

There is one other situation that is frequently fraught with injury of the cervical spine. I am speaking of car crashes, even those that are not very serious. If a car stops suddenly and the one behind it that is unable to brake in time crashes into it, the bodies of the driver and his passengers will remain immobile, because they are adequately protected by the seat-backs. But the head is automatically jerked sharply backwards at the moment of the crash. The cervical vertebrae are often damaged as a result.

It is just for the purpose of avoiding such injuries and their consequences that cars today have special headrests fixed to the seat-backs. This simple measure provides adequate protection against possible injury of the vertebrae, the ligamentous apparatus, and the muscles of the neck.

Now a few comments on the treatment of cerebrospinal injuries and their aftereffects. As in the case of other injuries, it is important to take the necessary measures promptly. Injuries are not only due to the direct damage of the spinal cord and of the spinal roots. In some cases this is not even the primary effect. Frequently an injury involves damage to the blood vessels supplying the cord with blood. Quite often there are haemorrhages that compress the spinal cord. There may also be displacement of the vertebrae and their fragments, as a result of which various parts of the spinal cord may be injured.

Sometimes it is enough to quickly return all the components to their normal position and to relieve the pressure on the undamaged spinal cord: the chances of almost full recovery increase by a hundredfold. It is for this purpose that operations on the spinal cord and spinal column are performed when necessary. When there is no need of an operation other measures are taken. In some cases, for instance, it is sufficient to apply traction and accomplish temporary fixation of the spine, as in the case of the girl who dislocated a vertebra when dancing the twist.

Medicines are also prescribed such as general tonics, and medicines to improve the circulation and trophicity (i.e. nourishment) of the tissues. Various electrotherapeutic methods are used, as well as exercise therapy and massage. There is also a treatment termed "treatment by fixing in the necessary position". This means that the injured organ (the limb, for instance, and in our case, the spinal column) is set in its functionally correct and least traumatic position. There is also a great variety of methods that are used in treatment at specialized resorts.

As to the remote results of cerebrospinal injury treatment, they may differ, and it is not always possible to predict them. The functioning of the injured spinal cord, even in those parts of it that have remained relatively unimpaired, is restored very slowly. This depends on a number of processes. Among them are the restoration or compensation of circulation, improvement of tissue trophicity, restoration of the conduction of motor and sensory impulses along the nerve trunks, and many others. The point is that a detailed examination of the patient, even with the aid of the most up-to-date electronic equipment, does not always permit to establish the exact extent of the damage to the spinal cord. This is why there are always grounds for hope that the patient's state will improve. In some cases even "miracles" may happen.

Long and persistent training, and remedial exercises, including those performed on various apparatuses (wall bars and special contrivances that help to make limb movement and walking easier), together with drug therapy yield good results in many cases.

A great deal depends on the patient himself: on whether he or she has a clear purpose, on the ability to adapt to a new state and not lose hope—in a word, on one's attitude towards life. Those who have a strong will to live have much better chances of getting well. It should be noted that most of the people that have suffered such injuries cope with their difficulties in the end. Many of the patients in the USSR are brought to Saki in wheelchairs (this is sometimes their only means of moving around). But statistics show that the number of marriages between patients at this resort is no lower than the number of marriages between the local inhabitants!

In this section of the book only those typical spinal injuries that are, to some extent, "the fault" of the sufferers themselves have been discussed. But there are a number of diseases of the nervous system that can also be tentatively regarded as traumatic ones. They include not only such diseases as injury of the spinal roots in the intervertebral space (as in radiculitis) but also the sharp compression of a nerve running through a narrow bone canal due to oedema of the surrounding tissues, and the sudden impairment of the blood supply to the nerve as a result of periodical compression of the blood vessel (for instance, the collarbone can press on a blood vessel during sleep, a blood vessel can be compressed if a person squats for a long time, etc.). A great variety of factors may cause such disturbances. Among them are the individual features of the development of the bony and vascular systems, hereditary predisposition, and many other factors.

Once a woman who was about fifty years of age, short, and quite plump came to me for consultation. It was immediately noticeable that she had a rather short neck.

"I do not feel any pain," she told me, "but sometimes, mostly in the morning, I lose all feeling in my hand. I wake up and have the impression that I have no hand. I don't feel it at all. I try moving my fingers and can't. And sometimes I'm unable to bend my hand at the elbow, to say nothing of lifting it. Then, after some time, it feels as if my hand is gradually becoming alive. But it takes some effort for this to happen. With my good hand I massage my numb fingers, and I bend my hand at the joints. Movement returns very slowly to this hand. First I feel it getting warm; then I get a feeling like pins and needles in it. You know, like when you have pins and needles in your leg, or your hand has been squeezed for a long time. And then it all passes."

"Does this happen only with one hand?"

"No. Sometimes it happens with the other hand, too. I've noticed that it usually happens when I sleep on my side."

I thoroughly examined her hands, arms and shoulders. Then I made a complete check-up of the functioning of her nervous system. Everything was in order. Her arterial pressure was within the norm. Evidently, when she slept, especially if she slept on her side, her collarbone pressed slighty on a major artery that supplied blood to all the tissues of the hand. Insufficient blood supply had a bad effect on both the nerves and muscles. When the blood flow was restored, everything returned to normal. I advised her to get used to sleeping on her back, and also to turn over more often in her sleep. I also prescribed a mild vasodilator—the PP factor (nicotinic acid); she was advised to take one pill three times a day for a month. Her condition soon normalized.

I have described a typical case. It is mostly women who suffer from such disturbances. This disease is accompanied by very unpleasant sensations, but is not fraught with serious consequences. However, there are cases when a temporary disturbance of blood supply to a nerve can have more serious results.

Once two women with absolutely identical symptoms were simultaneously admitted to the clinic. They were of the same age more or less, about 35. Both women were in perfect health, except that their feet had suddenly stopped functioning. Each foot, from the ankle down, drooped helplessly. If you took the foot in your hand and lifted it, the patient could overcome the resistance of your hand and lower it, but she could not lift her foot...

We had already seen such cases before, therefore we asked each women whether she had been doing any kind of work in a squatting position. It turned out that both of them had done just that. Both had been squatting for a long time while working in the kitchen garden. The point is that the nerve that controls the muscles which lift the foot, as well as the vessels that supply this nerve with blood, passes just in the hollow at the back of the knee joint. The nerves and blood vessels of some people may have slightly unusual features, and prolonged squatting leads to impairment of the blood supply to the nerve. Fortunately, such cases are rare.

I also saw another version of this type of injury. A young girl climbed onto a horizontal bar and sat on it for a long time. The points of support in this position were precisely the hollows under the knee joints. The result was the same as in the previously described cases. The treatment of such disturbances always takes a long time, lasting at least several months, sometimes up to a year, or even longer. Therefore if you have to squat on your haunches for a long time and feel that your legs are becoming numb, you should at once change your position. Stand up, and walk about a bit.

The same kind of disturbance can occur in the region of the shoulder girdle if one carries a heavy rucksack with narrow straps for a long time.

The conditions that I have described above are, ultimately, lesions of the peripheral nerves caused by insufficient blood supply. They are secondary, indirect effects. But as the reader already knows, there may be direct traumatic nerve injury as the result of compression, contusion or extreme chilling. In addition, not one, but a whole group of nerves may suffer. When many nerves are affected the disease is called polyneuritis (from the Latin "poly", meaning many, and "neuritis", meaning inflammation of the nerve). When one nerve is affected the disease is called neuritis.

It is very hard, almost impossible, in fact, to contuse just one single nerve, especially in an area where it runs through the soft tissues of the hand or foot. Whereas in those places where the nerve is rigidly fixed in a certain position, like, for instance, the ulnar nerve in the region of the elbow joint, such things can happen. I am sure that the reader has frequently experienced this.

Nature has placed these conductors of nerve impulses very wisely so that they get injured as little as possible. But these nerves, which are called peripheral ones (with respect to the central nervous system), get damaged mainly as the result of bone fractures, joint dislocations, compression by haematomas, etc., i.e. as the result of injuries. But the word "neuritis" means inflammation of the nerve. Why do we use this term in the above-mentioned cases?

Formerly it was believed that there could be isolated nerve lesions such as viral ones. But today it is well established that in the great majority of cases nerve injury is a secondary effect.

True, there can be other causes besides injuries. In the last decade certain nerve injuries began to be called tunnel injuries. Along its course the nerve may pass through a narrow bone canal—a tunnel. Any disturbance, for instance oedema of the soft tissues that coat the inner walls of the tunnel, is sufficient to tightly compress the nerve and impair its blood supply and, consequently, its function.

There is a rather common ailment called facial neuritis. This is neuritis of the nerve that controls the expression of one side of the face. When this nerve is affected, one side of the face becomes an immobile mask.

In many cases this condition develops as the result of compression of the nerve due to oedema of the tissues in the tunnel through which the nerve runs. In this case it is the canal in the temporal bone, also called the fallopian canal. The oedema may be caused by various factors.

Multiple nerve lesions, i.e. polyneuritides, have a different origin. In particular, they are often caused by poisoning. For instance, in former times white lead paint was used and as a result, lead poisoning was frequently encountered among house painters. Polyneuritis happens to be one of the typical manifestations of chronic lead poisoning.

Polyneuritis may be caused by avitaminosis, for instance when a person does not get enough vitamin B with a food. Today such cases are very rare.

But there is one other group of polyneuritides—polyradiculoneuritides, when both a large number of nerves and their spinal roots are affected. These are diseases of a different type. In most cases they are due to autoimmune processes, i.e. they are the result of a peculiar allergic affection. In the last ten years hormonotherapy has been successfully used to treat such diseases. Before that, the prognosis for such a case was almost always unfavourable.

And what if the nerve gets cut or torn as the result of an injury? Can it be restored?

It is generally known that nerve cells do not regenerate. Yes, indeed, the possibility of nerve cell regeneration is so small that it is practically of no importance for the restoration of function. But if the nerve cells remain undamaged, the nerve fibres that originate from them always regenerate. Unfortunately, however, they regenerate extremely slowly: about 1 mm in 24 hours. In addition, the fibres must not only regenerate fully, but they must also become covered by a special isolating sheath consisting of myelin. This process also takes time.

It is just the great amount of time that is necessary for nerve regeneration that is the main problem in the restoration of nerve function. The point is that as soon as the nerve fibre is broken, the muscle controlled by this nerve stops functioning. If this state of things lasts a long time, muscular atrophy develops, and the muscle starts to degenerate. The muscular fibres gradually disappear. This means that if the nerve needs a long time to regenerate fully, it will finally reach the place where there used to be a muscle, but there may already be nothing there to innervate. But if the distance that the growing nerve has to cover to reach the muscle is short, there may be almost full recovery.

Which of the peripheral nerves gets injured most often? The answer is the facial nerve, i.e. the nerve that controls all the muscles that take part in facial expression. Both adults and children of all ages may suffer from such diseases.

The signs of this disease may appear quite suddenly. For instance, upon waking up in the morning one may discover to one's astonishment that one-half of one's face has suddenly become immobile and mask-like, while the other half has retained all its normal movements. However, in some cases the disease may develop gradually: muscular paralysis in one-half of the face may spread relatively slowly, over a period of several days. This is very distressing for the patient and hard to bear.

Once, a young woman was admitted to our clinic. She was an economist by profession and had just started to work after graduating from the Plekhanov Institute of National Economy. She was a lively and very attractive girl with big eyes.

When we entered her ward on our rounds she was sitting with her face to the wall. She had stopped crying, but it looked as if she did not intend to turn round. At first we had to address her back. She gave a precise and very clear account of all that had happened to her.

About three days previously she had felt a pain behind her right ear. At first there was a slight pain, then shooting pains began. She took some analginum tablets and applied heat to the place where it hurt. But this had not helped much, and yesterday morning when she took a look at herself in the mirror, this was what she saw!...

At this moment the girl turned around abruptly. The diagnosis was "stamped" on her face, so to speak. The right side of her face was absolutely smooth. There was not one fold on that side, the eye was opened unnaturally wide, and the corner of the mouth was like a narrow slit. Her whole face had been distorted towards the unaffected left side. Her mouth was pulled over to the left, even the tip of her nose was deflected towards the left. Her eyes were red from crying. She had to undergo prolonged treatment—over a month at the hospital and several more months at an out-patient clinic. Finally, she was fully cured.

Why is it the facial nerve that suffers in so many cases? Why has wise mother nature not bothered to protect this nerve too? I think this might be explained by the following. Nature has laboured well to make human beings what they are. In particular, she gave humans a face, which by its expression can convey practically every feeling—joy, sorrow, and surprise—and every shade of one's emotions and moods. But these facial muscles are not vital to the survival of the organism. Without various facial expressions a person can still exist.

However, if, for example, the chewing muscles should get paralyzed... But it is no easy job to put them out of action: each chewing muscle has double innervation, in contrast to the facial muscles, which have only one-sided innervation.

Besides, the facial nerve runs an extremely complicated course. Beginning from a small group of nerve cells situated almost in the centre of the brain, this nerve passes through the brain, then runs along the surface of the meninges, and after that, through the long and tortuous canal of the temporal bone. It emerges from this canal behind the ear and branches in a specific pattern over the entire face. Each branch goes to a specific muscle.

At any point along this lengthy and complicated route the nerve may suffer from either local inflammation or from injury. We have already mentioned its possible strangulation inside the temporal bone canal. At the exit from the canal the nerve passes through a ring of lymph glands. If they become enlarged they may also cause intense compression of the nerve.

The long, twisting course of the facial nerve and the great variety of possible influences on it are the reason for frequent lesions of the facial nerve. There is no other nerve that passes through so many corners, at each of which it may be subjected to injury.

The patient, whose case I have just described, was completely cured, but not every case ends so happily. Sometimes the facial muscles do not completely regain their functions, especially if the patient did not consult a doctor immediately after the injury. In very few cases pharmacotherapy produces no results at all: this happens mainly when the temporal bone if fractured or when there are haemorrhages.

If conservative treatment has no effect, surgery is tried. Overall, there are no standard methods for treating this disease, as is the case with other diseases. There must be an individual approach in every case. But every plan of treatment includes, first of all, treatment of the cause of the disease (elimination of the oedema, improvement of nerve trophicity, improvement of conduction along the nerve, etc.) Stimulation of the nerve with weak electric currents was formerly widely practiced. Today, we do not use this procedure, because former practice has shown that it does not guarantee against complications.

In the course of my practice I have also encountered the most unusual cases of peripheral nerve lesions, i.e. the kinds that are considered “not typical”. However, the factors that caused them were typical enough.

Together with some colleagues I once examined several patients who had been sent to us for medical consultation. It is generally known that such consultations are necessary only in cases where either the diagnosis is not quite clear, or the applied treatment has proved ineffective. The patient who entered the room was a smart, well-dressed forty-year-old woman. Her appointment card indicated only her name and age. There was no diagnosis, not even tentative one. We tried to find out what was the matter with her. The woman answered our questions concerning her condition with great difficulty. She could not open her clenched jaws and could not part her lips more than one centimetre wide.

Our examination confirmed that her jaws did indeed have extremely restricted mobility. But there were no changes or pain in the region of the jaw joints. In fact, she did not feel any pain anywhere.

Forestalling my question, the patient told me with great difficulty that she had already consulted a dentist who had taken an X-ray. He had found nothing wrong with her jaws. But for already two days she has been unable to open her mouth fully. Nothing special had happened the day before her misfortune. She had had breakfast and gone to the office. In the evening she had gone with a girl-friend to a restaurant. Could this have been caused by the beefsteak being so tough?

Both my colleagues and I examined her

very thoroughly and found nothing wrong with her.

But doctors who have treated a great number of patients sometimes experience something like "insight". That was what happened to me in this case. I wrote one word on a small card and turned it face down, so that nobody should see what I had written. The patient was asked to wait in the waiting room. There was a general discussion of the possible causes of this very strange illness. Various suggestions were made, but no agreement was reached. We invited the patient in once more.

"When was the last time you ate fish?" I asked her.

"Oh, I quite forgot. We had fish that evening at the restaurant, just before the beefsteak. It was pike, and full of bones. I even choked on one."

I turned my card over and showed it to my colleagues. Only one word was written on it: "fish".

Yes, it was indeed an injury caused by a fishbone. It is a very rare case when the bone injures the nerve with its sharp point and thus evokes "lockjaw", which is a tonic reflex tensing of the chewing muscles.

Luckily, the bone was a small one, evidently only a broken-off tip. It would eventually dissolve. We prescribed the necessary treatment, and within three or four weeks the woman was cured.

The following is another, rather unusual case, the result of an everyday accident. It happened to a relative of mine who was a teacher and often worked at home in the evenings at his desk. Once, while rising from his chair, he struck his knee against the key that protruded from the lock of one of the desk drawers. The blow was a painful one. Then the pain temporarily passed, but a day later it returned. Walking was especially painful.

The X-ray revealed that there was a fissure of the kneecap. All the necessary measures were taken, of course, and the bone knitted. But the knee continued to hurt, and sometimes the pain spread to the shin muscles of the leg. And this was not the only thing: his shin muscles gradually began to waste away. A checkup did not reveal any pathology. All the nerves were intact. The patient could easily perform every type of movement. But the pain and the wasting of the muscles increased. What was the cause of this?

There is such a thing as reflex nerve damage associated with local injuries. It was the pain that proved to be the cause. The pain that spread from the kneecap that was healing had affected the trophic function of the nerve.

I prescribed only pain killers. At first the patient took a very dim view of my explanation. But the pain-killers did their job, the pain subsided, and special physical exercises (he did remedial exercises all this time) helped to eliminate the trophic disturbances and restore the skin muscles to their normal size.

In this chapter I have attempted to acquaint the reader with some of the injuries that may happen to various parts of the nervous system. I have described their special features and their most frequent causes. This is but a small part of what I could have told you. But I hope that even this short narration will make the reader understand how important it is to take reasonable precautions to avoid all sorts of injuries of the brain and spinal cord, injuries which sometimes have most serious consequences.

Do You Sleep Well?

Sleep Disorders

I quite often give lectures for the general public on medical topics. Whatever the topic, the listeners always send in questions concerning insomnia and its treatment.

Various forms of sleeplessness are widespread. They have a bad effect on a person's physical fitness, efficiency and general well-being. Insomnia is a serious problem. Specialized laboratories and even whole research institutes conduct research on it. Let us also examine it briefly.

Why do living organisms need sleep? This has interested mankind since antiquity. However, despite the tremendous efforts of physicians to solve this problem, today we still do not have a reliable and comprehensive answer to the question, just as there are as yet no sufficiently complete answers to questions about thought and memory, and what mechanisms underlie them.

However, we do know for certain that sleep is an absolutely essential component of human life. Gross disturbances of sleep lead to illness. If a human being (or any animal, for that matter) is totally deprived of sleep for a long time, he or she may die. In ancient England there was even a form of capital punishment that consisted in depriving the sentenced man of sleep. So you see, sleep is no laughing matter.

Today we know that in the depths of the brain there is a sleep centre and a waking centre. Damage to these centres leads to corresponding disturbances. But we also know that even with undamaged centres there may be various forms of sleeplessness due to other causes.

There is a definite pattern of sleep and wakefulness. An adult sleeps about 8 hours out of the 24 hours of the day. By contrast, eight- or nine-month-old children are awake for only 8 hours out of these 24.

As the child gets older, it sleeps less and less. But the relationship between the periods of sleep and waking that is typical for adults is established only when the child attains maturity. It is usually believed that old people need less sleep. That is not quite correct. It is obvious that by the time a person reaches old age he accumulates a lot of causes for various disturbances of sleep.

It is interesting that our usual diurnal rhythm, consisting of an 8-hour period of sleep and a 16-hour period of wakefulness, is probably nothing more than a habit acquired by mankind. It is quite possible that from the standpoint of physiology it would be better to have a short sleep every 3-4 hours. Some specialists point to just this need (suppressed over millennia) as the reason for the sudden drowsiness that most of us have felt intermittently at different, often mostly unsuitable, times of the day.

Such periodic sudden sleepiness is one of the forms of disturbances in sleep and wakefulness. But why do we mention wakefulness when we are discussing insomnia?

Sleep is inevitable. People who say that they do not sleep at all are not being quite accurate, to put it mildly. In most cases this means that they do not get enough sleep, that their sleep is disturbed.

Sleep disturbances are manifested in different ways. For instance, sleep may be superficial with frequent awakenings, or the stages of falling asleep or awakening may be independently disrupted.

In general, sleep has its regularities and its stages. At first, immediately after falling asleep, there is a period of about one and a half hour when deep "slow sleep" takes place. The second stage, lasting about 15 minutes, is "fast sleep" with vivid dreams. Then both these stages are repeated, and this continues several times throughout the night. Different people need different amounts of sleep, but the average, as has been mentioned, is 8 hours. However, there are people for whom 4 hours of sleep suffice. Peter the Great, Faraday, Edison, the eminent Soviet neuropathologist, psychiatrist and psychologist V. M. Bekhterew, and others slept 4-5 hours a day and retained their tremendous working capacity. But there are people for whom even 10 hours of sleep are not enough.

One might ask: How can one determine one's own personal norm of sleep? If one does not get enough sleep, one will feel it clearly and at once: one will feel sleepy in the daytime, one's attention will flag, one's working capacity decreases, and mood worsens. If, in spite of sleeping less than 8 hours, none of these signs appear, then the amount of sleep one is getting is probably one's norm. But doesn't the need for sleep also depend on being tired? Of course it does. But if a person gets his or her normal amount of sleep nightly, this dependence becomes minimal. We have already observed that sleep is not solely the result of tiredness.

The pathology of sleep may also be connected with disturbances in the waking state. Suppose a person suddenly falls asleep in the most unexpected place, in an uncomfortable position, or is drowsy and listless all the time. In some cases this may be the result of a sleep disturbance, of its natural pattern. In others it is the consequence of a distorted relationship between the phases of sleep and waking. Such phenomena can be observed in diseases that are accompanied by disturbances in the functioning of certain parts of the brain.

For instance, in the early twenties of this century a wave of lethargic encephalitis, or Economo's disease, swept over countries and continents. It was named after K. Economo, an Austrian neuropathologist who conducted a detailed study of the disease. In the last ten years this disease has become almost extinct. But at that time hundreds of thousands of people fell ill. In most cases there was a lesion of the sleep centre. Because of this Economo's disease was given a second name—lethargic encephalitis. Lethargy means long deep sleep, and this was often the only, or the main, symptom of the disease.

Quite a number of other diseases sometimes cause lesions of the sleep centre. These diseases may be of various origin: vascular disturbances, acute poisoning and chronic intoxication, tumours, etc. Fortunately, such cases are very rare. From time to time disturbances of sleep and waking are caused by extreme obesity: changes in respiratory regulation occur, and in consequence, there is disturbance of night sleep (this is also called the Pickwickian syndrome). But again the latter is due precisely to a disturbance of the normal pattern of natural sleep.

Among other factors that disturb normal night sleep are cramps and laboured breathing. The last is due to the difficult passage of air through the upper respiratory tracts. Just remember how many people snore! A person who snores disturbs the sleep of everybody around him, but first of all he does not get enough sleep himself. He wakes up from the sound of his own snoring *and from not getting enough air. Then he* falls asleep again and the whole sequence is repeated anew.

In some countries this ailment is even reflected in the laws. For instance, in England, if a husband or wife snores, it is a forcible argument in favour of divorce.

What has not been tried to prevent snoring! It has become a real medical problem. A lot of methods have been suggested:

sleeping in a special position, on one's side or on a raised pillow; devices for fixing the lower jaw during sleep to keep the mouth shut; nose drops before going to bed. And recently, scientists at the Stanford University in California have even begun to perform an operation that straightens out the veil of the palate (velum palatinum). Already over 400 such operations have been performed!

Thus, it is obvious that snoring and the associated respiratory insufficiency is a serious cause of sleep disturbances. Snoring depends also on the amount of oxygen in the air we breath. Because of this it is healthier to sleep with the window open.

However, perhaps most frequently disturbed sleep results from various neurotic states. They may be caused by trouble in the family and strained relations at the office, as well as by all sorts of worries due to someone's ignoble behaviour or even casual remark. Some people are unable to fall asleep after having read an exciting book or article. Others, who may become absorbed in, for example, a detective story, cannot fall asleep afterwards. They turn the light on again and read all night (especially if the book has been lent only for one day).

There is another interesting feature. The reader may know of such situations. If someone has read late into the night, he or she may reason roughly along these lines: "It does not really matter. I can get up later, so I won't lose any sleep." But one is hardly ever able to make up for lost sleep. The principle "later to sleep—later to rise" works only in youth, and even then not always. As one gets older, it is often the other way round: if one goes to bed late, or cannot fall asleep because one is deeply agitated by something, in most cases one will wake up at an unusually early hour with the same disturbing thoughts in one's head. This is one of the consequences of nervous excitement!

Thus, many people periodically suffer from various sleep disturbances. But with some, sleep returns to normal after a short time, while with others it remains disrupted for long periods of time, so that they need to see a doctor.

One may argue that today insomnia is no problem: there are so many types of sleeping pills! Unfortunately, it is not quite as simple as that. The uncontrolled use of sleeping pills gives rise to a special problem of its own.

Many people, relying on the achievements of pharmacology, begin to abuse sleeping pills. They take them not only when there is a real necessity, but often just as a "preventive measure". As a result, this leads to an even more profound disturbance of their sleep. The selection of sleeping pills is a grave responsibility even for a physician; it cannot be left to the personal choice of the user, as this may lead to extremely serious consequences.

Today there are, indeed, a lot of different sleeping pills with widely varying properties. In addition, there are a number of drugs that have a sleep-inducing side effect. Tranquilizers also help to fall asleep and are often used as soporifics.

Then why is it that only a professional physician with extensive knowledge in this field of medicine should decide which pills to take and when? First of all, it is necessary to correctly diagnose the cause of insomnia, and to determine just which stage of sleep is disrupted and what are the concomitant phenomena.

My own professional experience allows me to state quite definitely: in general, when there are no extremely serious conditions that are accompanied by a lesion of the brain centres of sleep and wakefulness, disturbance of sleep is never an independent disease. It is only one of the signs of an unhealthy state. In such cases a neuropathologist should be consulted.

Many years of practice have convinced me that often insomnia is the result of unskilled self-treatment, of the belief that "the drugstore has a cure for everything". Whereas there is nothing so damaging to health as self-treatment with drugs. Good sleep is essential. It is easy to destroy and often very difficult to restore. The latter requires both understanding and skill. The patient can acquire a certain amount of understanding, but only a doctor has the skill.

Once I had to treat a scientist who had decided that he could overcome his natural desire for sleep and work two or three days in succession without any sleep. "I will take some sleeping pills afterwards and catch up on my sleep", he thought. Meanwhile, he drank exceptionally strong coffee and tea, and took caffeine to keep himself awake. As a result, he was unable to complete his thesis and got insomnia. I had to treat him for a long time, without much success at first.

To disrupt one's regular order of life—the more so with the aid of sleeping pills—is not just risky. It should on no account be allowed! I am convinced that even when we start producing a "natural soporific", i.e. discover the substance that induces the brain itself to fall asleep, one should not "borrow" from the brain's own periods of wakefulness at the expense of sleep. But this is just what some people do quite often.

Frequently people cannot fall asleep because their nervous system simply cannot concentrate, and this produces a peculiarly chaotic state of the nervous processes. Curiously enough, a cup of not too strong hot sweet tea may help such people to fall asleep normally and to sleep well. This is an established fact.

Sleep is a process of paramount importance that ensures the normal functioning of the organism in all situations.

Forty years ago, I was a soldier of the 70th Guards Division that took part in the Orlov-Kursk offensive. As is generally known, the offensive was of great force. The Germans retreated and we pursued them day and night. We covered dozens of kilometers a day on foot. Sometimes we slept on the march: some walked with their eyes open; others, with their eyes shut. We even had dreams! And still, we moved forward so rapidly that the army transport and kitchen were left behind, so that we sometimes had to go without meals. This experience taught me the true meaning of the army words of wisdom "better not to eat than not to have enough sleep". The short periods of sleep we had were important for fighting fitness. Forty winks on the march and one was ready for battle. Whatever our ailments at that time, no one suffered from insomnia!

Thus, we have agreed that if one really needs drugs in order to sleep their choice must be left to one's doctor. But what measures can be personally taken to prevent insomnia or to restore normal sleep if it has become disturbed? First of all, critical situations, both in the family and in one's relations with other people must be avoided. Of course, it is easier to give advises than to accomplish this. Sooner or later one will fall victim to stress. When this happens, the conflict must be settled as quickly as possible so as to preserve one's own health and that of one's associates.

Systematically disrupting the regular pattern of one's life also contributes to sleep disturbance. The more the pity if it is caused by senseless behaviour, such as frequent bouts of drinking, playing cards all night, or reading late. One must remember that with regard to sleep all sorts of conditioned reflexes get established very easily.

Once I had a middle-aged patient. He was sent to me by an urologist to whom he had gone with the complaint that every night at one and the same time (4 a.m.) he felt an urge to go to the bathroom. There were no medical grounds for such behaviour. He just felt he needed to go!

After a thorough neurological examination that revealed no deviation from the norm I gave him some very simple advice: to drink no liquid just before going to bed, and he was to refrain from going to the bathroom when he woke up at night. These simple recommendations proved effective: soon he was cured. In his case it was an easily established conditioned reflex that had disturbed the normal pattern of sleep.

One will always sleep normally if one goes to bed and turns off the light every night at precisely the same time. And one should also always get up at the same time. Well, and what about weekends and holidays, when it is so tempting to stay in bed late? Even on such days, the routine should remain the same: one should get up, wash, have breakfast, and then, if one still feels like it, go back to bed.

A person who has slept well and had a real rest always looks better. There is an old book in my library that is entitled "The Art of Remaining Beautiful: A Present for Russian Ladies". It was published in St. Petersburg in 1802. Pushkin's heroine Tatiana from the epic poem "Eugene Onegin" lived according to this book. Almost 200 years ago its author advised: "To look well and be beautiful at a ball, a lady should have a refreshing sleep before it." It's a simple secret that everyone knows, but to follow this advice and always look well, one should have a normal amount of sleep—not less nor more than is needed. Excess sleep, i.e. deliberately sleeping too much, is also not good for one's appearance.

After going to bed and turning off the light, one's head may still be full of trivial thoughts. Do not hasten to take sleeping pills. Try to distract your attention.

Learn to relax. Some people may count sheep. Some prefer to conjure up visions of some "scene" or landscape, or focus their thoughts on a frivolous topic.

Sometimes people have a drink before bed, regarding wine as a mild soporific. On no account should that be done! Even a small amount of alcohol causes a sharp change in the character of the nervous processes. The pattern of sleep and the relationship between its stages changes: the result is insomnia. Usually after a drink a person falls asleep without difficulty, but wakes up earlier than usual without having gotten his or her full quota of sleep. When people drink they usually also eat heartily. Overeating also leads to various disturbances of sleep, but to go to bed on an empty stomach is also not too good. Everything should be done in moderation.

Some people drink a glass of warm milk before bed; others prefer half a glass of cold water with a teaspoonful of honey. Both these remedies can be a help. It all depends on the person and on his or her habits and diet. Of course, in this case the purely psychological factor, i.e. the belief that this remedy is an effective one, plays an important role, and there is no harm in this.

It is good to take a warm bath before going to bed. This is also a very old and wise recommendation. The bath should be warm, not hot, and should not last more than 10-12 minutes. A longer bath can cause an even more severe sleep disturbance. Therefore, try this out with caution: if after such a bath, one finds that one can't sleep, or that the insomnia has become worse, start taking a bath 2 or 3 hours before bed, or take a warm shower instead, but also for no longer than 10-12 minutes.

A lot depends on the sleeping conditions. One should always try to sleep in the bed that one is accustomed to. Just ask the people around you—many of them, though they may not suffer from insomnia, still have great difficulty falling asleep in a new place. The room must be well aired. It is better to sleep with the window open: it has been proved that even a slight decrease in body temperature is conducive to sleep, whereas an increase promotes awakening. The humidity of the air is also important for normal sleep. If the air is too dry, it makes breathing difficult. In some houses, especially those built of ferroconcrete blocks, the humidity of the air is low; therefore, it is necessary to humidify the air. This can be done with the aid of special humidifiers (that are sold in shops) or by a more primitive method, i.e. to hang up a wet towel or sheet in the room.

Quite often coughing disturbs one's sleep, especially in the case of smokers. Simple cough-drops or a lozenge may be a great help.

It is a well-known fact that one sleeps deeper at night if the room is dark. With many people the light of a street lamp, and especially moonlight shining in through the window, disturbs sleep. Therefore, it is better to have blinds on the windows. Some people prefer to sleep with a night-lamp on. All this is very individual and depends on a person's habits.

The following old-fashioned method used to be recommended: people suffering from sleep disturbances were advised not to use the customary snow-white bedclothes, but dark ones—black, dark grey, dark green or dark blue. They were also recommended not to sleep on high pillows; this should not be done in any case, irrespective of the colour of the bedclothes.

Let us recall once more the nightcap which was mentioned as a remedy for headaches. In many cases wearing a nightcap helps one to fall asleep. There is yet another method: a strip of soft, light-proof material (about 25 centimetres long and 8-10 centimetres wide) is placed over the eyes. Such a small blind helps to avoid the minimal visual sensation caused by light that penetrates even through closed eyelids. Another old recipe is to put something cool (but not wet!) on the forehead in hot weather. The feet should be kept warm: it is good to sleep in light, loose-fitting woollen socks and to take a warm foot-bath before going to bed.

Some other old-fashioned recommendations are as follows: put a handful of hops under your pillow, or drink a warm infusion of valerian (1 teaspoon per glass of water, steeped for 20 minutes). An alcohol compress on the stomach at night helps some people to fall asleep.

A short walk before going to bed can have a very soothing effect, as can some light exercises. However, one should make a reservation concerning the latter recommendation: it is not for everyone. For some people, doing exercises before going to bed has quite the opposite effect: it causes insomnia. In such cases doing exercises in the morning or in the course of the day will help to fall asleep quicker and sleep better.

Thus, there are lots of ways to normalize sleep. Some of them are still being used today; others have been unjustly forgotten. Try at least some of them before you start taking medicines for insomnia.

Naturally, one wants to know why doctors prescribe soporifics with such reluctance? And when they do prescribe them, why are they recommended in such small amounts and for short periods?

I shall try to explain why. There are situations when it is really necessary to take medicine to normalize sleep, although such treatment is, in point of fact, just a corrective measure. For instance, a misfortune has happened to somebody. As a result, this person has had a nervous breakdown and has begun to sleep badly. In this case, of course, it is appropriate to prescribe soporifics to tide him over this difficult period, the more so that such drugs also have a sedative, tranquilizing effect. During this stage, medicines are unquestionably beneficial. But after a short period, habituation develops, and some patients start demanding stronger drugs. Others become addicted to soporific drugs: they are unable to sleep without them. It should be mentioned that such a dependence is often not a genuine addiction, but an imaginary one. As a rule this happens to people with a weak will, but this makes it no easier for the patient. Together with his doctor the patient must look for a way to normalize his or her sleep.

People who set all their hopes on the drugstore should keep in mind that every medicine has a side effect, and that prolonged use can cause complications connected with the functioning of several internal organs. In addition, on prolonged use some soporifics themselves aggravate sleep disturbances. The point is that no single soporific affects all the stages of sleep simultaneously. Drug-induced sleep is never equivalent to natural sleep. This is why soporifics can only act as a support for a short time. Only a doctor can decide what sleeping pills should be taken, and for how long, and also whether they should be changed, or a combination of several drugs used. Otherwise the user may come to grief.

There is one other particular factor that disturbs normal sleep—nightmares. Some patients complain that they see real "horror films" in their dreams. If there are nightmares, sleep does not refresh; it brings no relief. Usually nightmares are the consequence of some experience that had a shattering effect on the victim. They are a sign of psychological, sometimes even of psychic, disturbances. In this case the use of soporifics that affect the short stage of active sleep, during which we have dreams, may sometimes be of help. But quite often, taking sleeping pills or ceasing to take them can, in itself, cause nightmares, or make them worse. All this is a very complicated matter, and to get good results one should consult a doctor with wide professional experience.

Unfortunately, not every person with disturbed sleep consults a doctor. If the right kind of treatment is begun at an early stage, it is possible to manage in most cases without soporifics or, in the worst case, to use them in minimal amounts. The following is a simple example. "Experienced" patients often come with the following complaint: "I take sleeping pills but they put me to sleep only for four hours. After that, I don't sleep at all." They are amazed when I tell them not to take a whole sleeping pill, but half of it, and to add half a pill of analginum. Such a combination produces longer and deeper sleep. It is a well-known, but rarely utilized, fact.

One should also consult a doctor because sleep disturbances, though this is rare, may be just a symptom of some general disease, which should be treated first.

It would be a good thing if in dealing with problems connected with sleep both doctors and patients adopted the main principle of medicine: "Primum non nocere" ("First of all, do not harm").

A Hundred and Twenty Thousand Kilometers

Vascular Diseases of the Nervous System

The summer that year was an unusually wet one. Sunny days were rare. My mother, who was already very old and frail, was finding it difficult: she frequently didn't feel well and had rheumatic pains. Glancing up at the grey skies she would comment with her usual humor: "Someone must have stolen the summer."

She was not the only one who felt unwell that summer. The sharp drops in temperature and humidity and the changes in atmospheric pressure were bad for many people, especially for those who suffered from cardiovascular diseases.

That summer many of my friends, knowing that I possessed a blood pressure apparatus, asked me to check their pressure. Others, who were not doctors, but had such an apparatus, also started checking their own blood pressure and that of their neighbours more frequently. People wanted to know why they felt unwell so often.

Indeed, today, checking the blood pressure is a method that is widely used for assessing the state of a person's health. But not everyone knows how to analyse the results, i.e. how to interpret them correctly.

I shall tell you about a patient of mine, a thirty two-year-old engineer. He was a restive, nervous kind of person. He came to the appointment in an agitated state. A prophylactic medical examination, conducted about two years earlier, had established that he had low blood pressure. He began to take medicines to raise his pressure. He started to drink coffee every day. But his pressure still did not rise to the "normal" values. The upper reading remained at a level of 90-100; and the lower reading, at a level of 50-60 mm of mercury.

Although he felt quite all right and his condition did not affect his working ability, he was seriously worried. He bought a blood-pressure apparatus (a tonometer) and learned to take readings of his own pressure. And all the time he was concerned with how to raise his pressure up to "normal" values. He considered his pressure "not normal" and believed that this would finally result in some kind of disturbance!

It was an awfully difficult job to convince him that these values were actually his personal "norm", that there was nothing pathological in such pressure. The more so as both his parents, who were elderly people, had arterial pressure that was definitely lower than the "norm" for their age group.

In general, today many people who have no professional training in medicine or biology are firmly convinced that all things in the human organism are strictly regulated, and that there is a "norm" for everything. Evidently this is an echo of our urban age, which seems inconceivable without the concept of standards. Unfortunately, the attempt to "squeeze" individual physiology into the rigid bounds of "norm" often ends tragically. One should just remember that each of us is "not like all the rest", and that everyone has his own individual physiological norms. The normal arterial pressure of some people may be not only lower than the average, but even definitely higher. And there is nothing dangerous in such deviations. This, by the way, applies not only to arterial pressure. It is true also for diet, for instance, for the ability to drink alcohol, and for many other things.

Any attempt to cram people into the statistical average is always fraught with all sorts of trouble. Nobody gets the idea of raising people like broiler chickens—all of the same weight and size—although this would considerably lighten the job of the clothing and shoe industries. Nobody is surprised that there are people with non-standard ways of thinking. On the contrary, this is welcomed, because this is the way that leads to scientific discoveries and inventions—to the development of all the arts.

But then what is the use, you may argue, of taking blood pressure readings if each of us is a non-standard individual? It is obvious that the readings will differ in each case.

And yet it is necessary to measure the blood pressure. The point is that checking the blood pressure is a very simple method of investigation that yields extensive information concerning the state of the leading vital system—the cardiovascular system.

It is known that if the blood supply to any part of the body, even to its smallest and farthest corner, is impaired, it always leads to disaster: this part may perish. This is why throughout our life thousands of kilometers of blood vessels of various diameters continuously carry blood to all the parts of the body. The circulatory system is a closed one, and about 6 litres of blood circulate in it. To keep this continuous circulation at a normal level, that tireless toiler—our heart—which acts as a powerful non-stop compressor, pumps the blood and works up the pressure necessary to push the blood through all the tiniest blood vessels—the capillaries. In adults, the blood vessels, capillaries included, have a total length of 120,000 kilometers: this is equal to one-third of the distance to the moon. An impressive figure!

At the moment when the heart contracts, the blood pressure reaches its highest level. This is called the systolic pressure (the systole is a phase of cardiac muscle contraction). Immediately after this, the diastole begins, which is the phase of relaxation of the cardiac muscle when the blood from the veins flows back to the heart. During the diastole, the blood pressure drops to about two thirds of its former level, but not more than to half of it. This is called the diastolic pressure. The pressure wave, generated by the contraction of the heart, achieves a velocity of 25 meters per second, which is equal to 90 kilometers per hour! But this velocity is not an end in itself. It makes it possible to supply all the organs and tissues of the body with blood. It permits the continuous distribution and redistribution of blood in accordance with the requirements of the organs and tissues, and ensures an adequate amount of blood for their functioning.

Because the blood flow has such a high velocity, it takes only a few seconds to complete the full cycle of blood circulation. Just imagine the tremendous number of controlling and distributing mechanisms that regulate the blood supply at every level!

The system of blood vessels and mechanisms that control the function of this system is an extremely complex one. In essence, these mechanisms consist of a huge net of nerve fibres and their endings in the walls of every blood vessel without exception. These endings are called receptors, and their job is to check the state of the blood pressure, the amount of oxygen in the blood, and many other parameters. The information from these receptors is transmitted to all the levels of the nervous system, which make the necessary corrections by sending commands in the form of nerve impulses. In response to them the vessels dilate when necessary, thus increasing the blood supply, or on the contrary, constrict.

Of course, the blood flow does not have such a tremendous velocity in all parts of the circulatory system. In the tiniest arteries—the precapillaries and capillaries—

the blood flow velocity is much lower. The total area of their cross sections is much larger than the sum total of the cross sections of all the arteries of various diameters. And it is just here, at the level of the capillaries, where the pulse fluctuations of the blood pressure are already completely suppressed and the blood flow is absolutely uniform, that conditions become ideal for conducting metabolic processes.

Now, let's return to the subject of blood pressure and assume that a person's pressure is 125 mm over 65 mm of mercury. These figures mean that the difference between his systolic and diastolic pressure is significant, and for many years this person will feel well. But if the blood pressure should suddenly rise, the person may at once start feeling unwell. What, in general, causes the systolic pressure to rise? There are many factors among which are an increase in the systolic volume of blood ejected into the arterial bed, and the acceleration of the cardiac rate, which also leads to an increase in the amount of blood that the heart pumps into the blood vessels. These two factors depend on cardiac activity. In addition, the state of the blood vessels can also cause a rise in systolic pressure. If the blood vessels lose their elasticity as a result of sclerotic changes in their walls, their volume becomes smaller. It becomes more difficult for the heart to pump blood through them and the systolic pressure increases. Prolonged active constriction of the smallest arteries has the same effect.

Sometimes it is said that the systolic pressure depends on cardiac activity, and the diastolic one, on the state of the blood vessels. This is not quite correct. The relationship between the factors that cause changes in blood pressure is so complex and depends on so many things, that singling out any separate cause is always an artificial approach. But still, by taking the blood pressure and comparing its values, we obtain enough information to get a picture, sufficient for all practical purposes, of the many parameters of cardiac function and vascular activity and the relationship between these two components of the circulatory system.

The method of determining blood pressure that is being used all over the world today was developed in 1905 by the Russian doctor N.S. Korotkoff. It is also called the indirect method, because it includes mediate (with the aid of a stethoscope) auscultation.

I have already mentioned that each person has an individual "normal" blood pressure value, but the average values for blood pressure change with age. Young people, between the ages of 15 and 20, usually have a diastolic pressure of 70-80 mm of mercury, and a systolic pressure of 100-120 mm of mercury. In people over 40-50 years of age, the diastolic pressure usually rises up to 90 mm of mercury, while the systolic pressure rises to 140 mm of mercury. The blood pressure of older people is naturally higher. All these values are however only averages.

Why does the blood pressure increase with age? There are many reasons for this. They reflect the state of many processes and disturbances that lead to changes in the vascular walls, in particular to sclerotic changes. But even pronounced changes in the state of the blood vessels do not always result in a higher blood pressure.

People usually ask whether it is better to have high or low blood pressure. Of course, it is best to have normal blood pressure, i.e. the one that is intrinsic to each individual. But the value of this normal pressure can be determined in each case only by comparative observation. One cannot determine it by taking the blood pressure just once.

We have discussed the factors that raise the blood pressure. And what about the ones that can make it fall? In the first place, this can be caused by the development of cardiac or vascular insufficiency. It can also be caused by chronic diseases, e.g. anaemia, tuberculosis, a sodium salt deficiency, and by many other factors. Low blood pressure is called hypotension*. Hypotension is usually defined as a morbid condition when an adult's blood pressure is lower than 100/60. Although, I know a case when a perfectly healthy person had a blood pressure of 60/30 all his life. Incredible as it may sound, it's a known fact.

Well, and what about hypertension? What are the highest levels of blood pressure above which a person should be considered to be sick?

Let's begin with the assertion that a person is really sick only if he or she has the manifestations of a disease, and not just high blood pressure. One should not confuse "hypertension" with "hypertensive disease". Hypertension usually means a definite, sometimes a significant, increase in blood pressure. Various factors may cause hypertension.

In 90% of the cases, what we have is hypertensive disease, which can be defined as a certain kind of neurosis that leads to overexcitation of the vascular brain centres. As a result, the vascular tone increases, followed by the subsequent increase in vascular resistance. This causes a corresponding rise in blood pressure.

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* Hypotension: the direct translation means abnormally low tension, just as the term hypertension means an increased tension. For example, muscular hypertension is a state of increased muscle tone. But when no special distinction is made, both these terms usually refer to the state of the blood vessels.

Hereditary predisposition plays a certain role in the development of hypertensive disease. Disturbances of the central nervous system, often caused by emotional factors, psychic trauma, etc. are also significant. A wrong diet, with an excessive intake of salt beyond the requirements of the organism, also promotes hypertensive disease, as do smoking, drinking, and many other things.

If the patient neglects necessary treatment, the blood vessels "age" rapidly, undergo sclerotic changes, and lose their elasticity. The heart also suffers greatly: it becomes increasingly difficult for it to cope with the increasing loads. All this is also far from harmless for the kidneys.

Well, and what about the other 10% of cases where there is hypertension? This is called symptomatic hypertension. For instance, there may be renal hypertension as a result of kidney disease, or hypertension due to an endocrine disease (such as a disease of the pituitary gland). Hypertension also often develops after injury of the brain. There may be other causes, but in every case symptomatic hypertension is just one of the symptoms of some other disease, whereas hypertensive disease is a separate form of the primary disease.

One is often asked what kind of doctor

treats hypertension and hypotension: a therapist or a neuropathologist? In most cases, a therapist treats this disease. Usually, the patient is sent to a neuropathologist only if these diseases have led to the development of some symptoms of disturbance of the nervous system. But even in such cases, the patient must still remain under the care of a therapist as well.

There are such states, however, when it is especially necessary to be treated simultaneously by both these specialists. I am speaking of a hypertensive crisis. What exactly is a hypertensive crisis? It is a sudden sharp rise in arterial pressure.

Just imagine what happens in the organism when the systolic pressure increases by almost twofold. In some cases the scale of the instrument proves inadequate for measuring such high pressure. The diastolic pressure also undergoes a sharp change. A hypertensive crisis is like a sort of fit, which moreover can cause extremely serious complications, such as disturbances in the cerebral circulation (usually a cerebral haemorrhage), acute cardiac insufficiency, and even myocardial infarction. But even if there are no such complications, the crisis itself is always a real ordeal.

During such sudden sharp rises of blood pressure the organism itself often comes to the rescue. Some patients have nosebleeds or haemorrhoidal bleeding (usually slight) during these periods. Evidently, it is not just the slight loss of blood, which reduces the amount of circulating blood, that is important. Any haemorrhage also induces a defence reaction, which is expressed both as intensified blood coagulation and a decrease in blood pressure.

Usually, a hypertensive crisis is one of the manifestations of hypertensive disease. But this is not always the case. As I have already mentioned, hypertension can result from a kidney disease, diseases of the adrenal and pituitary glands, and diseases of other organs. Thus, patients who do not suffer from hypertensive disease may also have hypertensive crises.

What leads to the development of such a vascular crisis? Unfortunately, it is not always possible to identify the true cause. But in most cases, a hypertensive crisis is preceded by severe emotional stress, the crisis itself being a direct sequel of this condition.

What are the symptoms of such a crisis? At first there is usually an intense (sometimes very intense) headache that rapidly worsens and is often accompanied by dizziness. Vision may worsen, as may the hearing. The victim may feel listless or, on the contrary, agitated and anxious. There may be pricking pains in the region of the heart, palpitations, and a feeling as if a "warm flat cake" has been placed on the skin over the heart. All these symptoms are accompanied by nausea and sometimes by vomiting. I have already mentioned the possible magnitude of the concomitant rise of blood pressure. However, one does not always find a direct relationship between the magnitude of the increase in pressure and the severity of the crisis. In some cases, a relatively small, but sudden, rise in pressure can evoke a crisis.

What should be done in such cases? The first, and probably the most important, advice is not to panic. One should, of course, call an ambulance at once. Until it arrives, the patient should be made to lie down in as restful conditions as possible. He or she should be given a tablet of validol or nitroglycerin. One should keep in mind that patients often have the medicines that they are used to taking with them. Naturally, one should avail oneself of this. Any tranquilizer will also have a beneficial effect, as will hot water bottles placed on the soles of the feet or mustard poultices on the calves of the legs. These are very simple measures actually, but all this brings quite noticeable relief. After this, the only thing to do is to carry out the doctor's orders.

What if the crisis results in one of the complications that were discussed above? In that case the patient is treated simultaneously for all three conditions: the main disease, the hypertensive crisis, and its complications. It is not always possible to carry out all these treatments at home; therefore if the doctor insists on the hospitalization of the patient, it should on no account be opposed. Patients with myocardial infarction are usually treated by therapists. Disturbances of the cerebral circulation are treated by neuropathologists.

Myocardial infarction usually means that the blood supply to some part of the cardiac muscle is impaired. What does "disturbance of cerebral circulation" mean? We also often call this a "stroke", "cerebral haemorrhage", "thrombosis", or "embolism". What is the difference between these states? A disturbance of cerebral circulation is a general term. It includes all of the above-mentioned states.

Stroke or apoplexy, is an acute disturbance of cerebral circulation. This term includes both cerebral haemorrhage and thrombosis of the cerebral blood vessels, which results in a sharp decrease in the blood supply to a certain area of the brain. Embolism is the sudden occlusion of a blood vessel, for instance by a torn-off fragment of the altered cardiac valve in the case of rheumatic disease, infarction, or vascular diseases of the limbs.

What causes haemorrhage or thrombosis?

First of all I would like to point out

that it is mostly people over forty years of age who get strokes. And the older the person, the greater the probability of a disturbance of the cerebral circulation. This implies that the main causes of strokes are the accumulating changes in the state of the vascular walls. These changes are brought about by the impaired trophism of the vascular walls, their thickening, and hardening (sclerosis), as well as by a number of other factors. High blood pressure over a long period of time is a factor that plays an important role in the changes that take place in the vascular walls. A sharp rise in pressure in such sclerosed vessels may rupture the vascular wall and cause haemorrhage.

Thromboses of the cerebral vessels are not so closely connected with hypertensive disease. Mostly, they are the result of pronounced atherosclerosis or other chronic diseases of the cerebral vessels. In these cases the lumen of the blood vessel gradually becomes narrower and vascular control becomes impaired. A spasm of the vessel may also prevent it from letting the blood through.

What will happen in this case? If a sufficiently large vessel becomes occluded a certain region of the brain will no longer be supplied with blood. If other vessels are unable to compensate for this insufficiency, this part of the brain will perish. The same happens if a vessel becomes occluded by an embolus.

It is in cases of embolism and haemorrhage that a disturbance of the cerebral circulation develops most rapidly. In thrombosis this is usually a slower process that develops gradually. By analysing the clinical manifestations of the disease and the rate of development of separate symptoms, a doctor can usually determine with high probability the character of the vascular process.

Serious strokes are not so frequent. In the overwhelming majority of cases an acute disturbance in the cerebral circulation does not result in such serious consequences as permanent paralysis, impaired speech, etc. But even such severe changes are usually reversible; they are called temporary, dynamic, or transient, disturbances of cerebral circulation.

In most cases a hypertensive crisis is also a transient disturbance of cerebral circulation. The gravity of such conditions can differ greatly. Patients with transient hypertension often do not need to be hospitalized, but can be treated at an out-patient clinic. Sometimes these disturbances are pronounced so slightly that the patient does not even consult a doctor. This often largely depends on the attitude and disposition of the patient, and on the amount of attention given to his or her own sensations. But there may be more serious cases, when there are signs of disturbance of the functioning of certain parts of the brain that are almost like the symptoms of a stroke.

How do doctors distinguish a transient disturbance of the cerebral circulation from a stroke? The boundaries between these two states are relatively clear. If the symptoms of a brain lesion disappear completely in 24 hours, it means that there was a transient disturbance of cerebral circulation. If these symptoms continue, then it is believed that a stroke occurred.

A transient disturbance of the cerebral circulation is caused by almost the same factors that cause other types of disturbances of cerebral circulation, but in this case they are less pronounced. The tendency of separate vessels to have spasms, as well as the tendency to develop changes in the system of blood coagulation, play an important role. This is why doctors so often measure the prothrombin index in patients over forty years of age.

What do we mean by a "disturbance of the functions of certain parts of the brain"? And how are such disturbances identified? For a neuropathologist who knows the structure of the circulatory system that supplies the brain with blood, as well as what functions are controlled by specific brain structures, this is usually not such a difficult problem.

Most of the blood in the brain is supplied from both sides by the internal carotid vertebral arteries. From these arteries the blood passes into the cerebral arterial circle (the circle of Willis) at the base of the brain. Blood vessels branch off from here in a strict pattern to each side of the brain: the anterior cerebral vessels run to the temporal and parietal lobes of the brain; the posterior ones, to the occipital lobes. The stem of the brain, for instance, also gets a large portion of its blood from the system of vertebral arteries. A great number of vessels in turn branch off from these arteries and also go to specific parts of the brain.

This can be illustrated by the following example. Let's say a person has had a stroke. After the first, most terrible day is over, or perhaps a bit later, it becomes evident that the patient's right hand and foot are completely paralyzed and speech is impaired. We know for certain that such a combination of symptoms can occur only if there is a disturbance of circulation in the system of the left middle cerebral artery. (The left one is indicated because it is known that most of the nerve fibres from the left hemisphere subsequently cross over to the other side, and vice versa. There is a special region where they cross over.) Thus, there has been a haemorrhage in the left middle cerebral artery. This has impaired the blood supply to the region of the anterior central gyrus of the brain that controls movement. It has also disturbed the blood supply to the adjacent speech centre (in right-handed people it is always located in the left hemisphere; and in left-handed people, in the right hemisphere). Everything is quite precisely determined.

The diagnosis for other regions of the brain is established along the same lines. Such lesions are also called focal lesions, because there is a definite restricted focus that is in strict conformity with the region supplied by a specific blood vessel. Independent of what has happened in this focus, be it haemorrhage, thrombosis or embolism, the clinical symptoms will be the same. If the focus happens to be a bit larger and involves the posterior central gyrus as well, then in addition to the symptoms already mentioned there will be disturbances of every type of sensation on the same side of the body and face.

This is a very severe brain lesion. It can end in disability and even death. When there is a circulatory disturbance in the region of the brain stem and it spreads to the respiratory and circulatory centres, the situation is especially dangerous.

To get good results in such cases it is especially important to start treatment at once. If the focus of the lesion is a small one, the blood supply may be restored before long with the aid of the adjacent blood vessels. We have already mentioned earlier that the cerebral blood vessels form a common, closely interlaced system. Besides, medical science today has a number of drugs at its disposal that help both to restore circulation and to normalize metabolic processes in the cells of the brain itself.

All this allows one to treat such cases quite successfully. Lethal outcomes in cases of stroke have become considerably rare in recent years. When the patient starts recovering, the restoration of lost functions becomes more rapid and more extensive. Today there are special rehabilitation departments everywhere where such patients receive aftercare. Quite a number of these patients are able to lead a normal life again. But medicine is not omnipotent as yet, especially when a person pays little attention to his health, and the changes in the blood vessels have become too pronounced.

We have just tried to examine what happens during a disturbance of the cerebral circulation and where these events take place. We have also tried to gain an understanding of the principles of neurological diagnosis. But what happens in the first stages of a stroke?

Stroke seldom occurs when a person is

resting. It usually occurs in the daytime, when a person is active. First, there is an intense headache, and after that, or sometimes almost simultaneously, there is vomiting. The face turns dark red. The victim loses consciousness, his or her breathing becomes hurried, and the pulse rapid. One side of the body may become paralyzed almost immediately: the hand and foot on that side become paralyzed, and often the lower part of the face as well (the mouth seems to twist to one side). Sensitivity to pain becomes sharply reduced on the same side of the body. Sometimes the patient does not lose consciousness completely, but seems to become stunned. Sometimes he or she cannot comprehend what is being said, and if the speech centre is implicated, is unable to speak even if conscious.

In some cases, there is hardly any change in the condition of the patient during the first period after the stroke. In others, his or her condition rapidly worsens because the cerebral haemorrhage may continue. The patient passes into a coma, i.e. a state of very deep unconsciousness combined with disturbances of the vital functions. It is precisely in such cases that the patient may die. But in contrast to severe infarctions, in cases of severe apoplexy, death is not instant. Even if there are grave complications, the patients usually live for at least 24 hours, sometimes longer. Fortunately, such outcomes are fairly rare. In most cases there is a gradual improvement after the stroke. But prolonged treatment is required.

What is the most important factor in the treatment of such cases? First, rest and immediate hospitalization are required. The patient needs to be under the constant care of a neuropathologist and a therapist. It is important to treat not only the cerebral vessels, but the whole circulatory system, and the heart as well.

In rare cases a stroke and myocardial infarction may occur simultaneously. Naturally only a doctor can establish the true situation and has the right to decide all matters concerning treatment. On no account should any independent actions be undertaken in such circumstances.

However, the patients themselves and the members of their families will also not remain unoccupied. No treatment can be really effective if the patient does not receive proper nursing care. The hospital staff is not always in a position to provide really first-class care for people who are seriously ill. A very strict bed regime is called for. It is necessary to see to it that there should be no creases in the sheets, because they can cause bedsores, which will make the patient's condition still worse. It is important to see that the patient eats and drinks at regular times. The doctor will prescribe the appropriate diet. Finally it is necessary to assist when the patient needs to urinate or evacuate. All this is no easy job when the patient is seriously ill. If, for some reason, the patient has remained at home, one must also remember to carry out the doctor's orders according to schedule.

Of course, the patient's family always wants to know if there is any hope for the patient. There is almost always hope. It is difficult to predict anything during the first minutes, or even days after the stroke. Sometimes, after a seemingly hopeless period, the patient may finally completely recover. One must fight for the patient's health in every case. Only this will yield the best possible results.

The prognosis is always a relative one and is very individual in each case. It depends, to a great extent, on the general condition of the patient's cardiovascular system, and on how wide and deep the brain lesion is. It also depends on a number of other factors, even on very personal ones.

On the whole, haemorrhages end better than thromboses and embolisms. This is because irreversible processes develop very rapidly in the region of the brain that is no longer supplied with blood. Whereas when there is a haemorrhage the tissues of the brain get pushed aside, as it were, and compressed by the blood clot. Oedema of the tissues develops around this place, and then gradually resolves. In addition, the brain tissue continues to be partially supplied with blood by adjacent blood vessels. As a result, in some cases, the focus of the lesion that at first seemed very large gradually becomes smaller, and some of the lost functions (movement, speech, etc.) are restored in quite a short time.

It would be wrong to conclude that vascular lesions of the brain always develop along the same pattern: first hypertension, then a hypertensive crisis, and after that a disturbance of the cerebral circulation. Luckily, such cases are comparatively rare. For people with hypertension, this is sooner the exception than the rule. As was already mentioned, it is not only hypertensive patients that suffer disturbances of the cerebral circulation.

There is a large group of diseases—transient disturbances of the cerebral circulation—which occur much more often than strokes. When this condition passes it leaves practically no traces. But one should not underestimate it.

Transient disturbances of the cerebral circulation are a sort of warning, a signal that something is wrong. Such spells of transient disturbances can be repeated. What's more, next time such a condition may turn into a real stroke, because the causes of the circulatory disturbances have not been eliminated. There still remain the changes in the blood vessels, and the defective coagulation, in particular the increased prothrombin. As a result, the blood elements have an increased tendency to stick together forming small lumps that can regress only up to a certain extent.

Transient disturbances of the cerebral circulation resemble a stroke to some extent, though the manifestations are much milder. These manifestations are also more diverse, both as to symptoms and gravity. There are acute and chronic forms of transient disturbances of the cerebral circulation. Depending on the cause of the disease, the symptoms may develop either very rapidly, acutely, or slowly (which is more rare). If, for instance, a vessel is suddenly blocked by a small blood clot all the symptoms develop suddenly. And if there is something like a redistribution of the blood, and part of it is diverted to another area (this is called the steal phenomenon), the symptoms of circulatory insufficiency develop slowly. As in the case of stroke, the signs of impairment of a certain function depend on the site of vascular disturbance in the brain.

The disease usually begins with a headache, nausea, vomiting, and a feeling of weakness. The patient complains that there is not enough air and that he cannot see very well. Sometimes the patient loses consciousness for a short period. Quite often there is numbness and tingling in small areas of the face, hand or foot, and less frequently, in the whole half of the body. There may be a slight impairment of movement, for instance in the hand or foot, or sometimes only in several fingers. In some cases an impairment of speech may be the only sign of the disease. This symptom may be combined with the other symptoms described above. Sometimes there may be loss of sight in one eye for a short time. The gait may become unsteady: the patient may stagger when walking. The movements of one of the hands may lose precision. There may even be brief convulsions.

In short, the symptoms may vary considerably. But each of them indicates that the functions of a restricted area of the brain are disturbed, even if any one of these symptoms lasts no longer than a few minutes.

In the first minutes, and even during the first hours, it is not always possible to distinguish a transient disturbance in the cerebral circulation from the beginning of a stroke. In any case, the patient should be put to bed. A doctor should be called and the patient should be given any medicines that have a vasodilative effect and improve the circulation, such as validol, papaverine, or valocordin. It is also advisable to give the patient a tranquilizer. In short, the same measures should be taken as those when stroke is suspected. Further treatment will be prescribed by the doctor.

Can one avoid diseases of the vascular system? Age and previous illnesses affect the blood vessels, as you know. Prophylactic treatment plays an important part in the prevention of such diseases. It consists of a whole complex of measures, including medicamentous therapy, regime, special diet, therapeutic exercises, etc. And one should, of course, avoid all factors that might have a detrimental effect on the blood vessels.

First of all I would like to mention such a factor as chronic alcoholism. It is also significant that alcohol disturbs the functioning of the nerve centres that control the state of the blood vessels. As a result, these centres send out absolutely inadequate commands that lead to vascular spasms. Also, drinking leads to a chronic deficiency of the vitamin B complex, which includes the vitamins B_1, B_6, B_{12}, B_{15}, nicotinic acid, and others. In some cases this hypovitaminosis cannot be remedied neither by a high-calorie diet, nor by taking the vitamins themselves. In the absence of these vitamins the vascular walls become fragile and brittle. In addition, nerve cells of every type are unable to function properly without these vitamins. And nerve cells do not regenerate.

One other cause of the diseases that we

have been discussing are injuries. Even a not very serious injury can sometimes result in small ruptures of some of the layers that form the vascular wall. At these sites an aneurism may then develop, i.e. a bulging out of the vascular wall in the place where it has become thinner. It is exactly in such areas that the blood vessels rupture most easily. As a result there will be a haemorrhage, either into the brain matter, or a subarachnoid one (i.e. into the space under the meninges).

As was mentioned before, the brain is covered by three meninges: the dura mater, the pia mater, and the arachnoid mater. The Latin word "arachnoidea" means "like a spider's web". The blood flows into the subarachnoid space, mixes with the cerebrospinal fluid and spreads over the whole surface of the brain. This causes a sharp increase in intracranial pressure. If no urgent measures are taken, the patient may die. In such cases it is necessary to perform a neurosurgical operation: two clips are placed on the damaged blood vessel, above and below the aneurism rupture. They pinch the walls of the vessel together and the haemorrhage is stopped.

However, aneurisms of the cerebral vessels are not always of traumatic origin. Sometimes they are a congenital developmental feature. In these cases there may also be a sudden subarachnoid or intracerebral haemorrhage. Often there may be simultaneous haemorrhage both into the brain matter and under its meninges. Such cases also require surgical treatment.

On no account does all what I have described mean that such conditions are inevitable. In general, "disastrous" vascular diseases are not frequent. As for primary diseases of the cerebral vessels that develop as a result of their unusual structure (such as a subarachnoid haemorrhage from an aneurism), they are extremely rare and can now be completely cured.

Most vascular lesions are, in the long run, brought about by our being inattentive to the state of our health and our circulatory system. The cerebral vessels are but a part, though a special one, of the human circulatory system. If one leads a normal life, keeps to the proper diet, observes a simple regime, and engages in physical exercises, one's circulatory system will be better preserved, more trained, and will not age so rapidly. A lot depends on the person himself. As for disasters such as head injuries, even in these cases the sufferer proves partly at fault, as a rule. Thus, the advice to be reasonably careful, and not to take unnecessary risks, will not be amiss, I believe.

Cerebral vessels often suffer from various infectious diseases, allergies, rheumatism, and other diseases. Moreover, it is not in every case that cerebrovascular diseases are connected with changes that take place inside the cranial cavity.

The reader probably has already understood that the circulatory system as a whole can be regarded as a single organ. Naturally, many processes, such as sclerotic changes and rheumatic affections, are of a generalized type. But in certain areas such disturbances can be more pronounced. For instance, there are rheumatic heart diseases, but a rheumatic affection predominantly of the cerebral vessels also occurs. There is a disease called chorea. It is rheumatism of certain ganglia of the brain caused by a general rheumatic process. The heart may practically not suffer in such cases.

The affection of certain blood vessels outside the cranial cavity may also result in cerebrovascular diseases. This may happen, for instance, in injury to the carotid or vertebral arteries that carry blood to the brain. Just imagine that the supply of blood to the brain through one of the main arteries—the carotid artery—has suddenly stopped for some reason. Would this be disastrous? Of course it would, but it might not mean total disaster in every case. I shall tell you of a case that I observed when I was not yet a doctor.

It happened over forty years ago. Our division was taking part in the Orlov-Kursk breakthrough and after a month of heavy fighting we had managed to push the Germans back to almost a thousand kilometers beyond the river Dnieper and its tributary the river Pripyat. Soon after the forced crossing of the Pripyat, I was seriously wounded and sent to a hospital. Almost at the same time a round-faced, tow-headed boy with a lot of freckles, named Vasya, was moved to the bed next to mine. He had a very thick bandage around his neck. He was always in a good mood and smiled a lot, but could converse only by gesturing with his left hand. He was unable to speak, and his right hand and foot were completely paralyzed as well. But he had been wounded in the neck! Although he had the same symptoms as most of the other patients, he looked out of place in our ward, because it was not his head that was bandaged, but his neck.

It amazed us at the time. Afterwards we found out that he had a bullet wound: the bullet had gone right through his neck, damaging the carotid artery, which had instantly become occluded. As a result he had all the symptoms of a lesion of the whole cerebral hemisphere.

After a very short time, to our surprise, Vasya began to recover quite rapidly. Movement in his hand and foot was restored, he started to sit up and even to get up. Two weeks later he suddenly started to speak. He immediately started speaking fluently, without having to learn to speak anew, as all the other patients in our ward had to.

After I passed through many different hospitals, I finally got well and entered the Medical Institute. It was then that I understood the reason for Vasya's condition. He was saved by that same cerebral arterial circle that lies at the base of the brain and receives the blood from both carotid arteries. At first, when one of the carotid arteries was suddenly blocked off, the blood supply to the brain did not cease completely. All the cerebral blood vessels still continued to receive blood, though in lesser amounts, through the cerebral arterial circle, and this saved the brain from really serious damage. After a time the organism became adjusted to the situation and the blood supply to the brain was almost fully restored as a result of the other, undamaged carotid artery increasing its supply. Evidently, there was also a compensatory increase of blood flow through the vertebral arteries.

When it was arranged for Vasya to be sent to a rear hospital he was already walking quite well and his speech was normal. With evident sympathy he tried to be of assistance to his fellow-patients, who were recovering much more slowly.

I know nothing of his eventual fate, but am sure that everything was all right. He had simply been very lucky. If there had not been an instant occlusion of the carotid artery at the site of the injury, he would have died very shortly from an excessive loss of blood. It is practically impossible to stop the bleeding from such a large artery in field conditions, the more so, to do it instantly. On the other hand, if the thrombus that had formed at the site of the wound had grown gradually until it reached the cerebral arterial circle at the base of the brain, the blood supply to the cerebral hemisphere might not have been restored.

What happens if the vertebral arteries somehow get damaged? If this happens, the blood supply to the brain stem, i.e. the part of the brain that contains a number of vital centres, will be impaired at once. Serious damage of these blood vessels is a very rare thing. It mainly occurs upon severe injury to the neck with concomitant damage of the cervical vertebrae. However, it is not infrequent for the functioning of the vertebral blood vessels, especially if they are sclerosed and have lost their elasticity, to be disturbed in cases of various metabolic disorders, particularly osteochondrosis. This usually happens when we "use" our neck as it should not be "used". Let me illustrate this statement.

Imagine that an elderly man has gone to the barber's for a shave. While turning his face up, he tilts his head back on the headrest and remains in this unnatural position for quite a long time. This means that there is an abrupt backward twist of the vertebral column and, consequently, of the no longer very elastic vertebral arteries. Circulation is impeded as a result, and the brain stem does not receive the necessary amount of blood. On account of this he may get a headache, feel dizzy, and in some cases, even lose consciousness.

The same can happen if the head is turned sharply and with great force. On the whole, one naturally can and should turn the head, but the older the person, the more carefully and smoothly this should be done.

Can one avoid such consequences by doing special exercises for the neck? Certainly one can, and what's more, one should. But these exercises for the neck ought to be performed correctly, with no abrupt movements, and smoothly, without attempting to turn the head further than possible, and without excessive strain so that the movement does not cause pain. These exercises should be performed for no more than five minutes at a time, but three or four times a day. One should also keep in mind that the same vertebral arteries also supply the spinal cord with blood.

Children very seldom suffer from diseases caused by damage to the blood vessels in the region of the neck. Such diseases are mostly the result of injuries. Children may, however, suffer from strokes, though such cases are considerably more rare than in adults. They may also have transient circulatory disturbances, haemorrhages and thromboses, but subarachnoid haemorrhages are more frequent.

These diseases can be caused by a great number of factors. First among them are injuries that are not so rare in children. Next, there are congenital alterations in the structure of the blood vessels, such as aneurisms. Blood diseases and impaired circulation resulting from heart diseases may also play a certain role in the origin of strokes. There are also other, less common causes.

So far we have discussed diseases of the brain due mainly to lesions of the arteries. But there are also diseases that are connected with impaired function of the veins that carry the blood from the brain and its meninges. Imagine that a stroke or a subarachnoid haemorrhage has taken place. Each of these processes causes an increase in intracranial pressure and, as a result, compression of the veins. This impedes the outflow of blood from intracranial tissues. The veins become overdistended and blood cells (erythrocytes and leucocytes) begin to pass through their walls into the brain matter and the submeningeal spaces. All this, naturally, makes the state of the patient decidedly worse. Because of this patients with diseases that are accompanied by a rise in intracranial pressure are prescribed medicines that expel excess fluid from the body and help to lower the intracranial pressure.

Furthermore, the outflow of venous blood from the intracranial tissues may also become impeded as a result of heart and lung diseases, such as chronic bronchitis, pulmonary emphysema and bronchial asthma. This is why the patient in such cases so often complains of headaches, and feels dizzy, listless, and sometimes stunned. Harsh coughing in such patients may make venous outflow even more difficult, thus causing a sudden rise in intracranial pressure, more severe headaches, and several other symptoms. Thus, coughing, one of the main defence reflexes, may seriously aggravate the condition of the patient in these situations. Thus, in such cases it is absolutely necessary to prescribe antitussive drugs.

It is not surprising that both adults and children suffer from a great variety of vascular diseases. Picture once more our circulatory system, which in adults, as was already mentioned, has a total length of 120,000 kilometers. This is a system that is connected with the functioning of every organ and tissue of the body, which permeates all of them and is continually controlled and adjusted at every level, in every part of the organism, even in its tiniest corner. It is only natural that in this extremely complex mechanism a single discrepancy may sometimes occur. Under certain circumstances this may lead to the development of a disease.

In conclusion, it should be repeated once more that it is a great pity that we are often careless about our health. It is necessary to be very considerate of our circulatory system and keep it in perpetual training, so that it should be able to withstand the significant stresses resulting from some of the situations that we are faced with during our lifetime.

Eternal War!

Infectious Diseases of the Nervous System

How often does a doctor hear such exclamations:

"You say I have an infectious disease? Where could I have caught it? I always wash my hands, eat only fresh, well-cooked food, and eat fruit only after it has been thoroughly washed. All the members of my family are in good health, and I have had no contact with anyone who is ill..."

One must confess that even these generally adopted sanitary measures, which we have long ago come to regard as the normal thing to do, do not always prove effective. Why is this so?

It is common knowledge that there is a great variety of innumerable microorganisms in the environment. Some of them may cause certain diseases. This is why the water in the towns and other settlements of this country continually undergoes special treatment to disinfect it, so that it could be drunk without misgivings straight from the tap, without boiling. Finally, one can boil the water, thus destroying any bacteria or viruses that may have been in it. But it is impossible to pour boiling water over every bit of food that does not need to be cooked, or to sterilize everything that surrounds us, to say nothing of the air we breath. However, it is precisely in the air, the food that we eat, and on the surrounding objects that there are heaps of bacteria and viruses.

What is to be done? Does this mean that we all live permanently in surroundings where at any moment we are in danger of falling ill and even dying?

Let's not exaggerate the dangers. Our environment is not a hostile one. It was precisely the environment that determined the conditions in which all the living organisms on our planet developed and multiplied in complex combinations.

What are these microorganisms that are

invisible to the naked eye—the microbes, bacteria and viruses?

A microbe (a microbiological object) is the general term for a minute living organism, invisible to the naked eye. This includes both bacteria and viruses. A bacterium is a living organism that has its own metabolism and produces substances that provide the energy resources necessary for its life.

A virus, however, is a very specific biological object. For years scientists have been debating about how to classify a virus. Should it be regarded as a living organism or as a substance? I consider it a substance, but a special kind of substance. Indeed, an isolated virus is just a group of nucleic acids inside a protein shell. In different viruses the composition of the nucleic acids and the protein shells may vary, but all viruses are built on the same principle. Actually, a virus is a small chromosome or, to be more exact, a block of packaged genetic information. The virus begins to behave like a live thing only inside the cell of a host organism. After the virus has entered such a cell, a number of processes that are controlled by the viral chromosome start taking place in the latter. Thus, the virus can "live" only in aggregate with the elements of a cell of the host organism.

There are two main types of virus-host interaction. The first type is when the virus adjusts the biochemical machinery of the host cell for its own reproduction. The host cell perishes as a result. This is the case in disease. The second type is when the viral chromosome merges with the host cell chromosome to form an integral whole. In this case the host cell actually receives a new chromosome and, as a result, the functions of the cell itself get altered to a certain extent. This process is called integration.

In this discussion we are mainly interested in virus-induced diseases. But the true cause of such diseases can be understood only if it is established why nature needs viruses in general. It is already clear today that viruses do not always act as a purely evil factor, capable only of causing diseases. Quite the opposite, the vast majority of viral diseases are accidental, being largely the consequence of our insufficient level of immunity. The role of viruses in nature is a very diverse one and has not been fully investigated as yet. It has been clearly proven, for instance, that they serve as carriers of genetic information. This is of the greatest importance for evolution and for many other processes occurring in nature. Further studies on viruses and on their role in the biosphere will help to reveal the true nature of viral diseases and, consequently, to develop effective methods of treatment for cases where up to now there has been no such treatment available.

A virus is many thousands of times smaller than the tiniest bacterium. But some viruses can cause diseases that are much more dangerous than those caused by bacteria. However, one should not forget that most viruses and bacteria fulfil a certain function in nature, and a beneficial one at that.

The body requires many bacteria for various functions, such as digestion. As to viruses, they are ubiquitous. They are always present in every organ, in every plant and animal. The following situation may occur: the pathogenic virus, or bacterium, may penetrate into the body, and may reproduce in it to a certain extent, but not cause a disease. The host organism in this case is called a "virus or bacterium carrier".

As for the nature of infectious diseases, this is a very complicated problem, certain aspects of which still need to be cleared. However, the very active development of this field of biology and medicine today gives one cause for optimism. Each year there is some new achievement. Not so long ago, for instance, it was believed that such diseases as pneumonia and diphtheria were caused by bacteria that were intrinsically infectious. Today we know that this is not always the case. Some bacteria become pathogenic only after being themselves infected by ... viruses. Bacterial viruses are called phages. The diphtheria bacillus, in particular, may cause diphtheria, a very serious disease, only when it itself is infected by the phage. The same is true for pneumococcus. At the same time, there are bacteria that cause extremely serious diseases without the involvement of the phage.

But there is quite a number of diseases that have come to be directly connected with viruses. They include smallpox, the flu, measles, rubella, mumps, poliomyelitis, Russian tick-born encephalitis, and many other diseases. Thus, are viruses really our enemies? The answer is both yes and no. Let us examine the situation.

Specialists know that of the 10,000 people who were definitely infected by the poliomyelitis virus during an epidemic of this disease, only one or two suffered seriously, i.e. became invalids or died. All the others finally regained their health, having acquired a reliable immunity to this virus for the rest of their lives. Can one call such a virus a killer? Surely one cannot assert that only killers live in a town of a thousand inhabitants solely because one of them happens to be a criminal?

Evidently the result depends not only on the virus, but also on the special features of a person's organism, the special properties of his or her immune system, which in this case somehow failed to cope. Consequently, the disease develops partly as a result of our own fault. It may be considered "an error" in some general regularities of the normal processes, in which the virus is a necessary partner.

But if this is the case, you may ask: Is it necessary to carry out all those various preventive vaccinations on such a mass scale? Yes, it is, and very much so. The aim is to prevent people from getting diseases. And until we find ways of identifying people with a predisposition to certain diseases that have a high risk factor we must vaccinate everybody.

All that I have just been discussing refers only to viral diseases. Diseases caused by bacteria are of a different origin, and in their case the evil factor is not so clearly defined. Because of this preventive measures against bacterial diseases will always primarily be not individual ones, but of the widest sanitary and hygienic type.

It has been mentioned that both bacteria and viruses can cause serious diseases. What are the differences in their interaction with the organism? The most important difference is connected with the "site of action". The viruses always penetrate into the cells of the body tissues. Each type of virus penetrates mainly the cells of specific organs, i.e. only those in which it can reproduce or accomplish some other kind of interaction with the host cell. For instance, the hepatitis virus penetrates the cells of the liver; the parotitis (mumps) virus, into the cells of the salivary and certain other glands; the flu virus, into the cells of the respiratory tract; and the poliomyelitis virus, into the motor cells of the spinal cord.

And what about bacteria? They do not penetrate the cell, though they also reproduce in specific structures of the body. For example, the diphtheria bacillus reproduces in the mucous membrane of the throat ring and releases a toxin, i.e. a poison that paralyzes the nerve fibres. This is why complications, such as difficulty in swallowing and myocardial damage, are so often seen in diphtheria. Various intestinal bacteria, which as can be deduced from their name lodge mainly in the intestine, have an almost identical effect. Other types of bacteria may release poisons, and cause purulent tissue dissolution, whereas a virus mostly destroys the cell in which it reproduces.

Neuropathologists study infectious diseases that principally implicate the nervous system. These include Russian tick-born encephalitis and other encephalitides caused by various viruses, poliomyelitis, shingles, meningitis, and many other diseases. It is not an easy job to simply enumerate all the diseases of this type. They are classed under the general name of viral neuroinfections, which means infectious lesions of the nervous system caused by viruses with selective affinity for various parts of the nervous system. And this is not all. Actually, in every disease, especially in an infectious one, even if the virus does not first directly damage the nervous system, there is often secondary damage to the nervous system as a result of developing allergies, or due to the development of a number of general disturbances, including metabolic ones.

There is a disease called epidemic meningitis. It is caused by the meningococcus—a bacterium that has a certain "affinity" for the membranes of the brain and the spinal cord (the meninges), where it reproduces best. A great amount of pus is formed in the meninges; it often covers both the cerebral hemispheres in an unbroken layer. Sometimes the infection can be carried via the blood into the brain itself. In this case the disease is called meningoencephalitis. Formerly, over 80% of patients with meningococcal meningitis died. Today the majority of patients with this disease are completely cured by antibiotics (primarily by penicillin). This happens to be the only bacterial disease that causes a primary lesion, as it is induced by an agent that primarily affects the meninges of the brain.

The pneumococcus, another causative agent, is a bacterium with a certain affinity for lung tissue. However, this agent can also cause purulent meningitis. But in this case the process that develops in the meninges will be classified as a secondary damage to the nervous system, because the bacterium primarily affects another site (the lungs). In the case of other inflammatory bacterial diseases, in particular in diseases of the paranasal sinuses, the ears, the teeth, the jaws, and also after injury, the process may spread to the meninges of the brain. In such cases the process is also classified as secondary purulent meningitis.

It may sound odd that diseases of the ears, of the antra of Highmore, and even of the teeth can cause meningitis, and even purulent meningitis to boot. Unfortunately, such cases are not so rare, especially if the primary disease was not treated and developed to an advanced state. The infection reaches the meninges via the blood, and in some cases even through the bones of the skull dissolved in places by the pus, and very soon purulent meningitis develops.

In most cases the infection, naturally, spreads with the blood. It is unable to penetrate through the healthy dura mater, because this membrane is such a tough structure that it is almost impenetrable for any kind of toxic substances, as well as for bacteria. Scientists have long been trying out its strength. In experiments the dura mater even withstood sulphuric acid, which destroys bone with ease.

Penicillin made it possible to fight meningococcal meningitis. Secondary purulent meningitis, however, is much more difficult to cure. In such cases a number of antibiotics with a wide-action spectrum are used, in addition to all the other measures. Besides this, urgent treatment of the primary focus of infection is required. For instance, it is often necessary to perform an urgent operation on the middle ear, or one of the paranasal sinuses, if there is a suppurative process in these regions, because antibiotics alone may not be sufficient to effect a complete cure.

This is why it is so important to try to prevent such complications and to undergo timely and competent treatment for every disease, however insignificant it may seem.

The spreading of a bacterial infection can lead to the development of an abscess in the brain matter. A tiny embolus, consisting of several purulent bacteria stuck together, may be carried into the brain with the blood from any kind of purulent focus, even from a very small or hardly noticeable one, such as the most insignificant pimple. A purulent dissolution of the tissues, which often attains large dimensions, gradually begins in the place where this embolus settles. As it grows, the abscess little by little dissolves and compresses the surrounding tissues, evoking a sharp increase in intracranial pressure.

It is not always easy to diagnose this type of abscess, because the clinical symptoms may vary widely. They depend on the site of the abscess and on the part of the brain that is being compressed by it. There may be paralysis, disturbances of sensation, impaired sight, epileptic fits, and all these phenomena in various combinations. In such cases the skill of the neuropathologist is manifested precisely by his ability to make a correct diagnosis by comparing the symptoms of the disease in the course of its development, the nature of the disturbances in the functions of the various parts of the nervous system, the general condition of the patient, and the presence of other diseases that sometimes seem insignificant. Then he must quickly perform some additional investigations and refer the patient to the neurosurgery department of a hospital for an operation. This is the only way to save the patient's life. Let me tell you about just such a case.

It happened about two years before the World Olympics in Moscow. A woman of about thirty years of age was admitted to our clinic with a tentative diagnosis of encephalitis. About a week earlier she had started getting headaches, mostly on the right side of the head. The pains had got worse and worse, tormenting her day and night. The patient preferred to lie on her right side without a pillow, with her head thrown back slightly, and her feet bent at the knees and drawn up. She lay clasping her head with both hands, as if trying to squeeze it. Her left eye protruded slightly and, the pupils were dilated with alarm. She was not crying, but her eyes were permanently moist, as if large tears would start to flow at any minute. She had not measured her temperature at home, and had been swallowing strong pills for headache, one after another. In short she had tried all the medicines that she could put her hands on, everything that her family and her neighbours had to offer. This had helped at first. But later, when she could stand the pain no longer, her family had called a doctor, who had at once directed her to a hospital. Her temperature turned out to be not too high, 37.2-37.4 °C. A neurological examination clearly revealed that the left cerebral hemisphere was implicated, but there was no impairment of speech.

What disease gives such a clinical picture? A number of additional investigations were carried out, including an analysis of the cerebrospinal fluid, an electro-encephalogram (an investigation of the bioelectric currents of the brain), and an echo-encephalogram (an ultrasonic method that allows one to detect the displacement of separate brain structures to one or the other side). These investigations confirmed the presence of a pathological focus in the left hemisphere, which had pushed aside and compressed the adjacent parts of the brain.

We were inclined to reject the tentative diagnosis of encephalitis because the clinical picture was more indicative of an abscess. But from what source could it have developed? There were no other diseases, no pustular alterations of the skin! Not a scratch! But there was something else: a few pimples on the face.

"How long have you had them?" we asked.

She answered in an annoyed voice (there they go, asking silly questions when I'm feeling so ill).

"A long time. I've tried to get rid of them by various means, but with no effect. Now I just squeeze them out. But then others appear."

There it was—the answer that put an end to our doubts. There was the source of the purulent infection that penetrated into the brain and caused a focal inflammation, and then the development of an abscess!

We at once called a team of neurosurgeons and an operation was performed the same day. They did, indeed, find an abscess, and quite a large one—the size of a hen's egg. Thank goodness we were in time and everything ended well.

Unfortunately, this process can sometimes develop in a different way, and it may be much more difficult to diagnose it correctly. And not every area of the brain can be treated by surgery.

Thus, a pimple on the face is a very dangerous thing, especially if self-treated. It seems that nothing could be simpler: just squeeze it out and that's the end of it! This is exactly what many people do, not knowing the danger of such an action.

Now, a bit more about viral affections of the nervous system.

Once I went mushrooming with a small group of friends in the woods near Moscow. We dispersed among the bushes that grew at the edge of the woods. Soon one of the girls came up to me and showed me a small insect that she was holding down with her finger in the palm of her hand.

"Look what a beauty! It was crawling up my hand, probably looking for a place to bite."

I shook off the "creature" with incessantly moving legs onto a piece of paper and called the rest of the party.

"We've seen such bugs before in these woods. What's so special about this one?"

"But this is an ordinary ixodes tick that may carry the virus that is the agent of Russian tick-born encephalitis."

"But we are not in the taiga, we are in the Moscow region!"

Half a century ago it was indeed believed that the tick that carried the virus of encephalitis could be encountered only in Siberia, in the taiga.

Today it has been established that this disease can be found in all the regions of the USSR where there are forests inhabited by such ticks. Ticks probably are not found only in the tundra, in the permafrost zone, and in the deserts. Not every tick, however, carries this ill-fated virus. And not every person who gets the virus by being bitten by a tick falls ill with Russian tick-born encephalitis. Incidentally, ticks do not bite in the real sense of the word. They adhere by their proboscis to the skin through suction, releasing at the same time a pain-killing substance. Thus, they feed on the victim's blood with the latter feeling no pain. Usually people do not notice when the tick "bites" them.

But one can get Russian tick-born encephalitis without being actually "bitten" by the tick. Sometimes it is enough for the tick just to have sat on the skin. Evidently the virus can be delivered onto the skin with the tick's saliva, and then it can get into the bloodstream through small cracks and scratches on the skin. These same ticks may carry not only the virus of Russian tick-born encephalitis, but the agents of other diseases as well. For instance, they may cause Q fever, or tick-born typhus, I personally have treated patients who had simultaneously fallen ill with two, or even three, diseases from one and the same tick.

But let us return to the tick that we caught in the woods near Moscow. Could we have got Russian tick-born encephalitis from it? Probably not. Strange as it may seem, in the Moscow region (where there are such ticks) there have so far been no cases of this disease. But in the neighbouring regions, cases of Russian tick-born encephalitis are no rarity. This disease is most widespread in the regions of Western and Eastern Siberia, in the Russian Far East and in the Baltic states.

What should be done to prevent people from getting this disease? People often go to tick-infested places not only for pleasure, but in the course of their work.

Soviet scientists have developed special, quite effective vaccines against Russian tick-born encephalitis. Recommendations concerning personal preventive measures have also been worked out. In particular, we advise people who visit places where there is a chance of getting this disease to dress in such a manner as to exclude the possibility of these ticks getting under their clothing. We also recommend people to periodically inspect themselves and their companions for ticks. Repellents—agents that keep the ticks away—are also used to treat clothes and the uncovered areas of the skin. Places for camping should be chosen away from trees, in areas free of bushes, etc.

If, nevertheless, a person who has not been inoculated against Russian tick-born encephalitis is infected by a tick, the victim is given a shot of human gamma-globulin that contains antibodies with protective properties against the virus of this disease. This measure is often sufficient to prevent the development of the disease, especially if it has been taken quickly and in time.

Russian tick-born encephalitis develops as follows. The victim usually falls ill between the first and the fourteenth day after being infected by the tick. At first there is general malaise and a sharp rise in temperature. Headaches and, in more serious cases, nausea and vomiting occur. Sometimes, in the mildest cases, these are the only symptoms. In serious cases there are symptoms of meningitis. In the most grave infections there may be signs of cerebral and spinal cord implication, and paralysis of the neck and arm muscles. Sometimes the functions of vital brain stem centres (the respiratory and cardiovascular centres) are disturbed, and in this case the patient may even die.

What should be done if a person gets the disease? The patient must immediately be put to bed, nursed with care, and then taken to a hospital. Such patients should always be under the care of a skilled doctor, because early treatment will help them to regain their health more quicker and more completely. One should keep in mind that this is one of the most treacherous diseases. Sometimes it seems that the patient has recovered completely, and even forgets that he or she had this illness. But six months later, and in some cases a year or two later, the worst part begins: spreading paralysis sets in once more and the patient gradually becomes an invalid. Such a course is typical for the progressive form of the disease. It may begin at an early stage immediately after the acute period. One cannot do much in such cases, as usually these processes are the result of an individual insufficiency of immunity to the virus of Russian tick-born encephalitis. We have developed treatments aimed at correcting the immune system of the patient. They allow one to arrest the development of the process in practically every case, and to obtain definite improvement in some of them. But it is impossible to restore what has been destroyed by the viral infection in the nervous system. Certain paralyses remain, and the patient has to adapt to life in these new conditions.

This is why prophylactic measures that help to prevent the disease—to prevent possible contact with the ticks—are of primary importance in the control of Russian tick-born encephalitis. In addition, measures are taken for exterminating the virus-carrying ticks. Extermination is carried out in very restricted areas, in places where there is the greatest risk of getting this disease. Such measures cannot be conducted widely, as other inhabitants of the forest also perish along with the ticks. This can have very serious consequences, such as the disturbance of the ecological equilibrium. But even in areas that have undergone such treatment, the same ticks will appear again after a period of 3 to 5 years. They will be brought there by birds and other inhabitants of the forest. Today scientists are conducting intensive research on biological methods of control for these ticks, but it is still a far cry to real success. One may ask, however: Can't encephalitis be liquidated just as poliomyelitis was?

There have been such attempts. But there are essential differences between these two diseases and their causes. The virus of Russian tick-born encephalitis is widely distributed throughout the world. It is carried by many forest animals, mostly rodents and birds, but predominantly by ticks. Humans are infected by the virus of Russian tick-born encephalitis from animals when they inadvertently intrude upon its natural cycle of circulation. Whereas in the case of poliomyelitis, the virus circulates only between people, it is a purely anthroponosic virus, i.e. one that passes from man to man. We have managed to develop a live vaccine, changing the properties of the natural virus and thus making it practically harmless. But so far we have not succeeded in developing a live, but completely harmless, vaccine from the virus of Russian tick-born encephalitis. However, work is continuing in this field. There is every reason to hope that soon this problem will also be solved.

Poliomyelitis is very seldom mentioned today. It is mainly discussed by physicians when they suspect a case. Even today isolated cases of poliomyelitis are registered in separate places, but they occur only in children who have not been inoculated. Why are some children not inoculated against poliomyelitis? There are various reasons. In very rare cases the reason is individual contraindication.

The main reason, however, is obviously relaxed vigilance. In the fifties, poliomyelitis was a terrible reality. It was not rare for this disease to have such grave aftereffects as paralysis, as a result of which the victim was often unable to move without assistance. Today the situation has changed completely. There is even a new generation of doctors who have never seen a case of poliomyelitis. And this is wonderful!

Nevertheless, both doctors and the populace should not become less vigilant in respect to this disease. The more so as foci of poliomyelitis still remain in various countries. Thus, even today in the African countries an outbreak of poliomyelitis is not uncommon. This is due to the fact that inoculation is still not being carried out everywhere, as well as the fact that there are natural conditions (constantly high ambient temperatures, for instance) that prevent rapid liquidation of this disease.

It so happened that during the fifties I had to diagnose and treat many cases of this disease. Even now I am often consulted in cases where poliomyelitis is suspected. Fortunately, this diagnosis is not confirmed in most instances. In the USSR it was mainly small children that suffered from poliomyelitis. As they grew older the risk of getting it decreased. But during outbreaks even adults got poliomyelitis in rare cases. In the USA during that period, just the opposite occurred: there it was mainly adults that got this disease.

Poliomyelitis has all the features of an infectious disease. It usually begins with fever that often increases in two waves. Usually, during the second temperature rise, there suddenly develops paralysis of both or one lower limb, and sometimes also of an upper limb. In different people different organs are affected. But independent of its localization, this paralysis always has the following common features: there is complete or partial loss of active movement, absence of the tendon reflexes, and early muscular atrophy. The muscles themselves become flaccid.

In some cases the paralysis spreads also to the respiratory muscles, which leads to a disturbance in respiration. Special equipment for performing artificial ventilation of the lungs was developed to help people in such cases. The patients had to remain in such an apparatus for a long time—from several weeks or months, to several years. Some of them died from respiratory disturbances and from lesions of the vital brain stem centres.

During those difficult years the government of the USSR took all possible and necessary measures. The Institute of Poliomyelitis was organized under the jurisdiction of the USSR Academy of Medical Sciences. Special well-equipped departments for treating such cases during the acute period of the disease and special hospitals for aftercare were opened at all the large medical centres. Surgical methods for treating the aftereffects of poliomyelitis were also developed. Special nursing homes at health resorts were set up for such patients. Most of the victims of poliomyelitis resumed their normal life. These measures greatly helped many others, but some unfortunate victims remained invalids.

Poliomyelitis is caused by one of the smallest viruses. It chiefly affects the cells of the anterior horns of the spinal cord from which run the motor nerve fibres. This is why there is paralysis. If less than 30% of these cells are affected by the virus and perish, there is no loss of movement. If more than 30% perish, there is partial loss of movement. But if over 70% of the cells of the anterior horn of the spinal cord are affected, complete paralysis will result. Hopefully, after revealing all these facts, the readers will not hesitate to have their children inoculated.

Unfortunately, the viruses of poliomyelitis and Russian tick-born encephalitis are not the only ones that are capable of affecting the nervous system. Probably every existing virus can cause some serious disease, including those that may implicate the nervous system in certain people. Evidently, the characteristic features of a person's immunity, i.e. its ability to protect the owner from this or that virus, is the most important factor.

The reader has probably encountered such common diseases as epidemic parotitis (mumps), measles, rubella and chickenpox. Well, in some cases these diseases may be complicated by encephalitis, and this may happen not only in children. As a rule, the older the patient, the more severe the disease. Special vaccines have been developed against these diseases. Inoculation against measles is a widely conducted measure. It is not so uncommon for mumps to be followed by meningitis, which, luckily, responds well to treatment and usually passes without leaving any traces. After these diseases, lasting immunity is acquired and one does not have them a second time, as a rule.

There is evidence that after the infection has completed its course these viruses do not disappear completely from the organism. Some of them remain in a "masked" state, somewhat like a "knot" tied as a reminder. The mechanism of immunity is evidently connected with this fact.

In very rare cases, this "knot" may become untied. Our immunity is not an absolutely stable system. From time to time it may be lowered for various reasons. This may happen, after injuries and diseases, as a result of the growth of tumours, or due to many other factors. Some of the viruses, previously latent, may become active under these conditions. In particular, the chickenpox virus can sometimes cause such a disease as shingles, or, to be more correct, herpes zoster. It is mostly adults, including elderly people, who suffer from this disease.

It has the following symptoms. In most

cases first a narrow strip of skin that corresponds to the position of two or three costal arches in the region of the chest (but it can also be on the stomach, the head, or any other part of the body) becomes slightly painful and then begins to itch. Soon there appears a rash on this strip. It consists of vesicles and small, hard, reddish spots that subsequently merge in some places. Indurations are formed beneath the skin, which then turn into vesicles and small purulent ulcers on its surface. Small crusts of blood are formed in some places. There are unpleasant sensations in the whole of this region, but it is the pains that are especially bad. Later on the small ulcers heal, the bloody scabs gradually fall off, and the skin becomes clean again. But the pains may remain for a long time, up to half a year and longer, at times becoming unbearable.

This disease requires a prolonged treatment. The rash on the skin is regularly smeared with a solution of Brilliant green or various ointments. A number of drugs are taken orally. Only a doctor can direct the treatment!

People who have once had shingles are guaranteed against ever having it again.

There is another viral disease that is sometimes accompanied by a skin rash that may resemble shingles. This disease can recur many times. It is even called recurrent herpes and is caused by the herpes simplex virus. It is the same virus that so often causes vesicular eruptions on the lips, especially during the course of other diseases. It is a harassing illness. These eruptions reappear again and again: once every one to three months, or less frequently, and always in one and the same place, i.e. on the buttocks, and on the genital organs. They are accompanied by general malaise. Lately a special vaccine has been developed for treating diseases caused by herpes simplex. We have no more effective remedies at present. Antibiotics, on which people so often set their hopes, are powerless against this virus. They are required only during bacterial complications. Modern science has no effective remedies for viral diseases as yet.

In extremely rare cases the same virus of herpes simplex can cause a serious brain lesion—herpetic encephalitis. It is one of the most dangerous diseases with unpredictable consequences. There is a number of encephalitides caused by other viruses besides the ones that have been mentioned. Especially extensive research in this field was conducted throughout the world in the twenties. At that time the world was alarmed by a comparatively "new" disease—lethargic encephalitis. Later it was called Economo's disease (it was mentioned earlier, as you recall). It was first evidenced in the environs of Verdun during World War I and became firmly established on every continent. The victims fell into a lethargy, i.e. a state of continuous sleep from which it was almost impossible to rouse them. The disease also had grave complications, such as lesions of certain deep-lying cerebral ganglia. This was manifested in the form of the so-called Parkinson's syndrome: the patient's movements became constrained; he or she walked with small steps and could not stop immediately. In many cases this was accompanied by incessant salivation. Usually the intellect did not suffer.

In some cases the acute period passed occultly, but afterwards there also frequently developed a late complication in the form of Parkinsonism. By the thirties this disease had become almost extinct, and today there are practically no confirmed cases of it.

What caused this disease? All the signs—both the clinical picture and the course of the disease, as well as the results of laboratory investigation of the brain—pointed definitely to a virus. But at that time virology was just emerging as a science. The research methods that science uses today were not available then. Probably this is why the virus was not definitely identified. Today it has still not been reliably identified. But it was investigations on precisely this disease that proved a powerful stimulus for developing the study of encephalitides—the inflammatory viral diseases of the brain.

The point is that only some viruses have a sufficiently distinct tropism (affinity) for certain brain cells, which they affect. When the brain suffers mainly from a secondary effect, for instance as a result of intoxication, injury, vascular disturbances, or other factors, we usually use the term encephalopathy (which is derived from two Latin words: *encephalon*, meaning the brain, and *pathia*, meaning suffering). Thus, there is toxic encephalopathy, traumatic encephalopathy, vascular encephalopathy, etc.

Arachnoiditis is one of the more common infectious diseases of the nervous system. Recall that arachnoidea means the arachnoid membrane of the brain. The name of the disease is largely arbitrary. Since there are no blood vessels in the arachnoid, strictly speaking, there should be no inflammation. In addition, any type of inflammatory process is never restricted to just one membrane. Usually when we use the term arachnoiditis we mean a small inflammation of the meninges restricted to a certain area. Actually this is a meningitis, but it is localized and poorly pronounced. The disease is never so pronounced as in the case of purulent meningitis, when the whole surface area of all the meninges, both of the brain and the spinal cord, is involved.

Arachnoiditis can be of various origin: it may be traumatic, infectious, reactive, etc. As to inflammatory processes, in most cases the restricted local lesion of the meninges is caused by the bacterial infection that has been brought in from the purulent foci in the paranasal sinuses or in the ears. Viral diseases are usually not complicated by arachnoiditis. As a result of the inflammation at the site of the process, the meninges sort of stick together in a restricted area, or a slight film forms on them. This leads to various disturbances in the normal passage of the cerebrospinal fluid.

If arachnoiditis spreads further, several such areas may develop, or separate areas of the meninges may even be closed off, forming liquor-filled cavities somewhat like cysts. These affected meningeal areas, depending on their size and localization, will give different clinical pictures of the disease.

It is rather difficult to diagnose this disease. Depending on the localization of the affected areas there can be headaches, vertigo; the involvement of separate areas of the cerebral cortex in the process with resulting slight motor or sensory disturbances, and sometimes even epileptic fits, cannot be ruled out. Since "stuck-together" area remains in this state for a long time, the symptoms of this disturbance are manifested almost constantly. In this case we are faced with the aftereffects of arachnoiditis. As a rule, such diseases do not cause any exacerbations.

This kind of "adhesive process", as neuropathologists call it, impairs not only the normal circulation of the cerebrospinal fluid over the surfaces of the meninges, but also its absorption into the venous system (because parts of the meninges may be shut off). This being the case, any other concurrent disease, e.g. the flu, which increases the strain on the circulatory system, will increase the disturbances in the circulation of the cerebrospinal fluid. As a result there may be a rise (and sometimes a drop) in cerebrospinal fluid pressure, and a number of symptoms may consequently become more pronounced. When the flu or some other disease passes, the circulation is restored and the patient begins to feel better. Thus, such conditions are not true exacerbations or recurrences of arachnoiditis. It is more correct to call them decompensations. Every process in the meninges usually ends with a balance being achieved between the circulatory function and the spinal fluid dynamics at a level that provides for the necessary metabolic processes in the brain, i.e. it ends with compensation. This means that in a person who has formerly suffered from arachnoiditis or meningitis, a number of illnesses can cause decompensation more readily than in a completely healthy person. All these factors must be taken into consideration when treating the patient.

There is a number of medicaments that effectively allow to compensate both the developing vascular disturbances and the disturbances in cerebrospinal fluid circulation.

Thus, the term arachnoiditis is often used as a certain equivalent for a number of restricted processes that involve separate areas of the meninges.

Sometimes we hear our patients say: "I have got postinfluenzal arachnoiditis." Is this really the case? It was already mentioned that viruses usually do not cause arachnoiditis. This happens only if the influenzal infection is complicated by a secondary bacterial infection as a result of exacerbation of some chronic inflammatory process in the paranasal sinuses, the ears, etc.

And what about the influenza virus? Can it affect the nervous system? I believe it is difficult to name a disease that is as well-known and as treacherous as the flu. No other infection has so many different types of complications, sometimes extremely serious ones, that involve the nervous system.

Victor N., a young man down with the flu, had a normal temperature by the fourth day of his illness. But his doctor extended his sick-leave for three more days. "Since I have so much free time," thought Victor, "why not go skating?" So off he went to the skating-rink. But two days later he suddenly got a headache and felt dizzy. Thus, instead of going back to work in a week, Victor was unable to work for a whole month. And later he also often suffered from headaches, which were sometimes accompanied by nausea. Several years have passed, but Victor is still not rid of periodic headaches.

It is exactly this feature of influenzal infection—its ability to cause complications—that is so treacherous. But unfortunately people often forget that the flu means not only a cold, a cough, and high temperature, but various complications as well.

The influenza virus affects the surface layer of cells in the respiratory tract. Settling in these cells, it not only disturbs their function. As a result of the active reproduction of the virus and the death of its host cells, toxins are produced. These are poisonous substances that cause a kind of poisoning of the organism called intoxication. Sometimes the virus can directly affect certain parts of the nervous system. Chills, headaches, fever, general weakness, aches in the bones, muscles and joints, rheumatic pains, sharp pains in the eyeballs when they move, and increased sweating—

all these manifestations are caused by the effect of toxic substances on the nervous system.

Each part of the nervous system plays a specific role in the human organism. At the same time all its parts are closely connected and supplement each other. The functions of all the internal systems of the body, as well as the relationship between the human organism and the environment, are controlled by the autonomic nervous system. The symptoms of the disease described above indicate that it is precisely this system that is primarily affected by the influenzal infection.

If the disease has a benign course, immunity is acquired relatively quickly. The intoxication is also rapidly reduced, and soon complete recovery occurs. But the disease does not follow such a smooth course in every case.

The toxin can cause necrosis (destruction) of separate parts of the walls of the cerebral vessels. This may lead to multiple haemorrhages into the brain matter or the spaces under the meninges. As a result, the patient may lose consciousness, suffer convulsions, become paralyzed, etc.

Here is another case where the patient had to pay dearly for his own carelessness.

Sergey L., a student who was ill with the flu, decided that he would not let his illness keep him from taking part in a sports competition. Having told nobody of his condition, he took part in the tournament and showed rather good results. But a few days later he was taken to the hospital in an unconscious state. When he regained consciousness he found that he could hardly move his right hand and foot and that his speech was impaired. He spent over five months in the hospital. He regained the ability to move his hand and foot only very gradually, and had to practically learn anew how to speak, read, and write.

The most common complication of flu is the so-called arachnoiditis. It was already pointed out that arachnoiditis is rather the result of bacterial infection, evident or lying dormant until activated by the influenza virus, than a lesion of the meninges caused by the influenza virus itself. A good preventive measure against complications is the timely treatment of chronic ear, nose, and throat diseases. Sometimes the flu can also cause a lesion of the trigeminal, facial, and other nerves.

Naturally, people who do not stay in bed when they are ill and do not call the doctor suffer complications much more often than people who do. The former not only injure their own health, but are also a danger to the people around them, as they spread infection.

People who have had meningitis, arachnoiditis or encephalitis should be especially careful. For such people the flu is more dangerous. If there is an epidemic of the flu they should at once take all the possible precautionary measures: they should be vaccinated for the influenza virus or use some other recommended remedy, such as rimantidine; they should try to avoid crowds, and should observe the rules of personal hygiene more rigorously than usual.

One should always remember that even if one's temperature has dropped, and one feels quite well and seems to have recovered even the capacity for work (all of which usually happens towards the end of the first week of flu), it does not mean that one has really recovered. Only the doctor can decide whether or not one can return to work.

I have told about influenza complications in such detail because they are rather common. Incidently, they are typical also for other similar diseases classed under the general heading of "respiratory viral infections". Besides the flu, they include parainfluenza, adenoviral infection, and others. In such diseases, complications are caused by intoxication and the development of allergies.

The diseases mentioned in this chapter do not cover all the infectious processes that affect the nervous system. The reader already knows that there are primary diseases of the nervous system, caused by viruses that selectively affect only the cells of the nervous system, and that there are secondary diseases in which the nervous system suffers secondarily, as a result of allergies developing in the course of general infectious viral diseases. In addition, a number of bacteria can also affect the nervous system. Besides the diseases already mentioned there are others, such as tuberculous meningitis or meningoencephalitis, and leptospiral meningitis, as well as various severe lesions of the nervous system resulting from syphilis, etc.

There is yet another large group of allergic affections of the nervous system that are accompanied by multiple nerve paralyses. These are diseases such as polyneuritides and polyradiculoneuritides, which are often indirectly connected with both viral and bacterial infections.

This list can be added to. Unfortunately, all these illnesses are far from harmless. It is difficult to fight them both during the acute stage, i.e. at the very onset of the disease, and during the aftercare period, when trying to liquidate the residual effects.

In addition, there are several chronic infectious lesions of the nervous system. I have already mentioned the chronic progressive forms of Russian tick-born encephalitis. Certain other viral diseases of the nervous system can also be of a protracted character.

Besides all this, there is a special group of diseases which so far are only assumed to be viral. There is no conclusive evidence that they are caused by viruses. Whereas the role of allergies, as well as of hereditary factors, in these ailments has been definitely proved. But it is not the kind of heredity in which certain traits are strictly passed down from one generation to the next. In this case we mean a complex combination of separate factors accumulated in different lines, which leads to the development of a genetic predisposition. This explains the random appearance of such diseases in certain families. As a rule, they are not repeated in several generations of one family. So the children of people with such diseases need feel no apprehension for themselves or their children and grandchildren. As to the supposed viral agents of such diseases, evidently they can act only as the triggering factor, not the causal one.

Multiple sclerosis, a disease known already for over a century, can be cited as an example. Unfortunately, we have not been able to cope with this disease as yet. However, thanks to scientific effort certain progress, and no mean one, has been achieved in the treatment of multiple sclerosis, especially during the initial stages of the disease. Treatment with certain hormones, for instance, sometimes has such a good effect on the condition of the patients that they are able to return to work. In many cases the process can be arrested, especially by remedies that act on the immune system.

What is the nature of this disease and how is it manifested?

Multiple sclerosis mostly begins with mild, not clearly marked symptoms. There is weakness in both or one lower limb, the gait becomes slightly unsteady. Eventually the movements of the patient's hands become awkward and badly coordinated. In some cases there may be retention of urine. The clinical symptoms of this disease are very diverse. There are cases when a person in seemingly good health has sudden loss of sight in one eye. Subsequently, in some cases, the sight is suddenly restored even without treatment, in others it is not.

It may happen that after a gradual onset of the disease and progressive augmentation of its symptoms, sometimes right up to paralyses, suddenly, as a result of treatment or even without it, all the disturbances disappear and the previously impaired functions are restored. But the disease can recur, sometimes more than once.

True, there is another disease with manifestations very similar to those of multiple sclerosis. I am speaking of acute disseminated encephalomyelitis. In this case, the symptoms vary less frequently. Sometimes there is a more ready recovery, but it is not always a complete one. This disease is treated in the same way as multiple sclerosis, but here the treatment always proves more effective.

What other measures besides medicines can help such a patient? There are many procedures, but in every case it is absolutely imperative to be treated by a doctor who is well acquainted with the patient's state of health. I am afraid one has to repeat this continually, because patients often literally rush from doctor to doctor. Or, having heard of some novel treatment, they travel hundreds of miles for the "last hope". They consequently discover that the treatment for this disease is more or less everywhere identical, as are the results, while precious time may have been lost.

What must be done besides medical treatment? There must be a strict regime, including normal sleep and a proper diet. And although medicine has limited resources for treating such diseases, the results will be much better if the patient carries out all the doctor's recommendations concerning his or her regime and life-style. Upon discharging from the hospital, the patient is always given a leaflet containing basic recommendations.

In particular, the patient is not allowed the following: to change climatic zones (even for short periods of time); to be exposed to direct sunlight in any kind of weather, irregardless of the ambient temperature; to undergo great physical strain or lift heavy loads even for a short while; to do physical exercises, including those requiring various implements (lifting dumb-bells of any weight, etc.); to engage in any type of running, including regulated therapeutic running; to perform yoga or any other exotic exercises. The diet should be regular and varied, but on no account rich. It must include animal proteins (meat, fowl, fish), vegetables, and fruit. Fat and fatty meat should be excluded, and the amount of salt limited. There must be a sufficient quantity of liquid if there are no direct contra-indications because of other diseases.

Alcoholic drinks of any kind, even in very small amounts, are a sure way to worsen the patient's condition, to cause an exacerbation or a recurrence of the disease.

Practice shows that all these simple measures help to achieve a stable improvement in the patient's health, whereas not following them may result in an irreversible worsening.

Such recommendations are given not only to patients with multiple sclerosis and multiple encephalomyelitis, but also to patients with a progressive form (with augmentation of symptoms) of Russian tick-born encephalitis and other chronic lesions of the nervous system with a protracted course and a tendency to progress. In particular, amiotrophic lateral sclerosis, or ALS, is such a disease. It involves the slow progressive lesion of the motor cells in the spinal cord and the brain.

ALS is a disease that is also difficult to investigate, and there are many things concerning its nature that are still not clear. It is assumed that this disease is also caused by some kind of virus.

As you can see, there are many diseases, besides the well understood infectious ones, in which the role of infection is only assumed as yet. In addition, medical science is continually discovering "new", previously unknown, diseases. For instance, over twenty years ago a disease of the nervous system was discovered in Hawaii that was confined to members of the Fore tribe. The local name for it was "kuru", which means "merry" or "laughing death". A person ill with kuru would begin to walk with a dancing gait, display involuntary movements, and laugh from time to time. A number of other symptoms would also be present. All who had this disease inevitably died within a year or two. The American scientist D.C. Gajdusek established the nature of kuru, and was awarded the Nobel Prize for his work. He found that it was caused by a special agent that in certain aspects resembled a virus.

Several such diseases are known to date. In humans there is kuru, Jacob-Creutzfeldt disease, and others. Animals are also subject to infections of this kind. Such diseases as scrapie (sheep prurigo) and the Aleutian disease of minks are well known today.

The illnesses that have been discussed above are very specific ones. They chiefly affect the nervous system, and their causative agents have features that markedly differentiate them from all the other causative agents so far known to science. Because all these diseases develop very slowly, without an acute stage, they constitute a special group of so-called slow infections.

We have observed that encephalitis is an inflammatory disease of the brain, whereas meningitis is an inflammatory disease of the meninges. Accordingly, the names of these diseases only indicate that part of the nervous system that is chiefly affected by the infection. But for a doctor today this information is not enough. It is necessary to establish the origin of the disease: what specific bacterium or virus has caused it, or, as we say, it is necessary to determine the etiology of the process. Only after having done this, can one formulate the exact diagnosis, in which the etiology must be specified in every case: for example, Russian tick-born encephalitis, tuberculous meningitis, etc. This kind of diagnosis is extremely important, first of all for choosing adequate treatment. Special bacteriological and virological laboratories exist for such investigations. Various materials taken from patients, such as swabs and lavages from the nasopharynx, faeces, blood, and, finally, the cerebrospinal fluid, are sent to these laboratories. To get reliable results some of the tests are repeated at specific intervals. The methods used vary widely: from the simple microscopic examination of slides and the culturing of the causative agents on special media to the infection of laboratory animals with these materials and subsequent examination of the animals and investigation of samples obtained from them.

I must say that of all the tests that need to be carried out, the patients themselves and their relatives most of all dread the necessity of investigating the cerebrospinal fluid, or, to be more exact, the process by which it is extracted. There is a completely groundless fear that various complications may result, sometimes very grave ones, after a spinal puncture. Fortunately, this is far from true. During the many years that we have worked with such cases, neither I nor my co-workers have ever seen a more or less marked complication, not only in our own department (where we daily perform a large number of spinal punctures), but also in the departments of other hospitals where this procedure is also frequently performed. The procedure itself is much less painful than, for example, an intravenous injection, and it lasts less than a minute.

But it is an extremely necessary one. This investigation is decisive for the diagnosis; it reveals how pronounced the process is and clarifies the specific features of its dynamics. Moreover, almost in every case a puncture is also a therapeutic measure which brings quick relief to the patient. No doctor will ever perform a spinal puncture, take blood from a vein, or give extra injections if there is no actual need for them.

Our main principle remains the same: "Noli nocere!"

Thus, this chapter has described in general outline the most common diseases of the nervous system that are of viral and bacterial origin, as well as those diseases that are presumed to be caused by infection. The problem, as I have tried to show you, is a very complicated one, not only because there is a great variety of diseases and some of them have not yet been thoroughly investigated, but also because they differ individually in different patients. All this presents a mass of problems to the doctor in every case. And the resolution of some of them depends largely on the patient—on the patient's faith in the doctor, on the strict observance of all the doctor's prescriptions and recommendations, and, finally, on the patient's conviction that he or she will recover. And there are grounds for optimism in practically every case.

The progress in medicine today allows one to hope that in the near future answers will be found to all the problems in this field that as yet remain unsolved.

We Cannot Change Your Nature

What Other Diseases Are Treated by Neuropathologists?

A young couple and their seven-year-old child came for a medical consultation. Their complaints were rather typical: the boy was very high-strung; from time to time he would be like a devil on wheels; he invented all kinds of games—war and Red Indians; and he turned everything in the house upside-down. Lately, he had become terribly cheeky. Could I give them some pills to calm him down a bit?

There he sat: a boy like any other boy, with eyes full of mischief, giving smart answers, just like a grown-up. All the family members are involved in his upbringing—mother, father, grandmother and grandfather—everyone doing what they can. But the boy is impertinent not only to his mother, but to all grown-ups, even to those who visit the house briefly.

A neurological examination turned up nothing. It was clear that the child was quite healthy, and that his behaviour was the result of his temperament and the unwise upbringing and conflicting demands of the grown-ups. And anyway how could one possibly expect a seven-year-old to behave with complete obedience?

It took a long time to convince the parents that the child had no nervous disorder, and that all that was needed was to coordinate their efforts in his upbringing and to be sure to take his temperament into account. Upbringing was the only way to influence his individual traits; it is impossible to change a person's nature.

In fact, no treatment is needed for many things that spoil our life, disturb our peace, and upset our relations with other people. Of course, with modern drugs one can suppress a child's natural high spirits, cheerfulness and initiative, but on no account should they be administered! This would hamper the development of the child's individuality, creative attitude to life, and ability to express himself fully in the future.

I often have to listen to complaints of the difficulty of interactions with people.

"Most people keep their temper, whereas I flare up at the slightest remark. I regret it afterwards, but at the moment I just seem to lose control..."

"When did you first notice this?"

"I've always been like this, as far back as I can remember. And both my parents were quick-tempered. Is there a cure for it?"

But, strictly speaking, what is there to cure? The individual traits of a person's character? Drugs for suppressing reactivity and excitability should be used only if a morbid condition suddenly develops, independent of its cause. But if all these things are just individual traits, manifestations of a person's character, then there is certainly no need to treat them. Just think, can a person depend all his life on drugs, which, as we know, besides everything else, will sooner or later have a bad effect on his health?

I foresee the reader's objection: after all, a person's temperament always influences the course of his illness, especially if it is a nervous disorder. Shouldn't this be taken into account when prescribing treatment?

Of course it should. And this is especially the case when the disease mainly involves autonomic nervous system, which is the most susceptible. Let us examine this problem.

The human nervous system is an integral whole, but it consists of two components, as it were: the somatic nervous system (the Latin word *soma* means body) and the autonomic or vegetative (which literally means plant) nervous system. Thus, the somatic nervous system ensures the realization of motor activity and sensation, while the autonomic nervous system innervates the internal organs, blood and lymph vessels, all the muscles, as well as the central nervous system itself. The autonomic nervous system unites and coordinates all the bodily functions, ensuring a state of the body that today is called homeostasis. It is defined as the relative dynamic constancy of the internal medium of the organism and all its physiological functions in the necessary relationships. It includes circulation, metabolism, regulation of body temperature, and many other things.

Any disturbance or "maladjustment" of the interaction between various parts of the autonomic nervous system, including its centres, is called vegetative dystonia. There can be local and general disturbances, as we call them, of the functions of the autonomic nervous system, depending on the level and the part of the nervous system in which the malfunction has occurred.

Both the separate manifestations of the disease and special methods of investigation, sometimes even the simplest ones, are important in making the diagnosis. Body temperature, for instance, is one of the main criteria for assessing the state of a person's thermoregulation. Excessive perspiration, or, on the contrary, increased dryness of the skin are also manifestations of the regulatory function of the autonomic nervous system with respect to the body temperature, the water and salt content, etc. There are many other parameters and methods for evaluating the state of separate parts of the autonomic nervous system.

Some people demonstrate changes that are not clearly defined; others reveal pronounced ones. Besides, some people are more emotional than others: some blush easily, for instance; others are very quick-tempered. The reactivity of the autonomic nervous system is different in different people and depends on many things. Can all these variations be regarded as manifestations of a disease? Of course they cannot. These are innate individual traits of character. The reactivity of the autonomic nervous system of one and the same person may differ sharply at different periods of his life. This is especially true for such periods as puberty and the climacteric. During these periods the reactivity of the autonomic nervous system sometimes reaches levels that are far beyond normal ones, and this usually leads to a lot of trouble. Such states should already be regarded as morbid ones that need both counseling and treatment with drugs.

It is sometimes hard to discriminate between a vegetative dystonia that has developed in response to some external factor and a primary disease of the autonomic nervous system.

The clinical manifestations of vegetative dystonia are not so clearly defined as in other diseases of the nervous system, though, at times they are sufficiently well marked. They include, in particular, disturbances in thermoregulation in the body, which may sometimes be the main syptom and be manifested as elevations in body temperature "without visible cause". There may be cold hands and feet, pale and dry skin, or just the opposite, i.e. excessive perspiration; there may be wide fluctuations in blood pressure, changes in the pulse, disturbances in general cutaneous sensation. In some cases there may be a tendency to have constipation or diarrhea, and sometimes a tendency to urinate frequently.

Such patients are often inclined to be corpulent. But there may also be a loss of weight "without any reason". Some people have unpleasant sensations in the region of the heart, feel chilly, and often have disturbed sleep. Such patients do not feel well when exposed to the sun and in hot weather. They become apathetic, indifferent to their surroundings, and become focused on their illness. All this results in a decrease in their working capacity, in the development of depression. These are the main symptoms, though far from all of them.

What can cause such diseases? Very many things. Any infection, for instance, especially during the acute period, is always accompanied by various manifestations of vegetative dystonia. These symptoms may remain for a long time, and afterwards disappear very slowly. In general, all types of vegetative disturbances always normalize rather slowly. A vegetative dystonia may also accompany other diseases, poisoning, injury, etc. Even overheating in the sun, to say nothing of sunstroke, can cause a vegetative dystonia. And in every case it may have different manifestations, depending on the individual's general state of health, as well as on the preceding condition of the patient's autonomic nervous system and its innate features.

The endocrine system also participates in controlling the functioning of internal organs, as well as of the organism as a whole. The functions of the autonomic nervous system are very closely connected with those of the endocrine system. This is why every endocrine disease is always accompanied, to a certain extent, by manifestations of vegetative dystonia. Thus, we have ascertained that vegetative dystonia is a disturbance of the general regulatory effect of the autonomic nervous system. It can have various clinical manifestations, predominantly vascular changes, increased perspiring, trophic skin lesions, etc.

Besides such general diseases there are also a number of relatively restricted lesions of local character, when it is mainly individual ganglia of the autonomic nervous system, or separate parts of this system that are affected. In the chapter on infectious diseases of the nervous system we have already discussed diseases resulting from lesions of the sympathetic ganglia caused by the herpes zoster and herpes simplex viruses. Now I shall give an example where the cause is quite a different one.

Every human being has a so-called solar plexus. This is a ganglion of the autonomic nervous system which, in particular, has a very close connection with the function of the stomach, the gall bladder and other internal organs. When a person has cholecystitis, gastritis, or a peptic ulcer, this ganglion is continually irritated by pain and other stimuli, and its function becomes disturbed. This, in turn, disturbs the normal autonomic innervation of these organs from this ganglion, and the disease may intensify and progress. Because of this, when a disease like one of those mentioned above is being treated, simultaneous treatment of the autonomic nervous system is always administered. Appropriate drugs, as well as physiotherapy and local reflex effects with the help of such things as a hot water bottle, compresses, etc, are used for this purpose.

The prophylaxis both of vegetative dystonia and of disturbances in the functioning of separate ganglia of the autonomic nervous system consists first of all in preventing the development of any disease, either general or local. But if a person does fall ill, a doctor must be consulted at once, and one must undergo immediate and full treatment for the disease. Practically, vegetative dystonia very often develops both as a result of neglecting to treat a disease and of following a wrong and irregular diet, of gross and systematic violation of one's regimen. This is why a doctor is sometimes unable to identify the initial cause of a vegetative dystonia, especially in an advanced stage of the disease.

The nervous system as a whole not only controls and regulates the functioning of all the internal organs, but, in its turn, depends to a great extent on the state of these organs. Moreover, certain lesions of the nervous system may be due solely to diseases of the internal organs: the kidneys, the liver, the lungs, the heart, and other organs. Accordingly, this branch of science is called somatoneurology.

There is also a more specific branch of neuropathology—stomatoneurology, which specializes in studying and treating nervous disorders resulting from diseases of the teeth or jaws. Neuropathology also studies, diagnoses, and treats tumours of the nervous system, genetic (i.e. hereditary) diseases, sexual diseases, and many others. Conditions resulting from overheating, sunstroke, electrotrauma, and being struck by lightning also belong to the realm of neuropathology.

Among the clinical problems that neuropathology deals with, an important one is epilepsy, a disease known from ancient times (and formerly called the falling sickness). Patients with any kind of convulsions or fainting fits of unknown origin are also sent first to a neuropathologist.

Sometimes a single, but clearly marked, symptom immediately reveals that a neuropathologist should be consulted. Let's take such a commonplace thing as hiccoughs. Who hasn't had them? They are caused by various factors. Hiccoughs may be caused by irritation of the stomach wall after overeating. Some people have hiccoughs after eating hot food. There may be hiccoughs in certain types of psychic trauma, etc. Hiccoughs may be induced by intestinal obstruction, by irritation of the diaphragm. But they can also be due to a primary lesion of the nervous system, such as encephalitis. In very rare cases hiccoughs may be the only symptom of encephalitis, and they may continue for many days, even weeks. It can be a real torture for the patient. It is not always easy to identify the cause of this symptom.

There are a number of other symptoms that at first glance look like isolated ones such as, for example, alexia (the inability to read), agraphia (the inability to write), acalculia (the inability to count), aphasia (the inability to speak), and others. All of them are symptoms of a focal brain lesion and are mostly encountered as part of a complex group of clinical symptoms. But the patient and those around him may regard such a symptom as an isolated one, because their attention is focused entirely on it alone.

Many, very many diseases need to be treated simultaneously by a neuropathologist and doctors of other specialties. For instance, neuroses, epilepsy, and impaired memory are also treated by psychiatrists.

Impairment of memory, in particular, is a very complex problem. Science is still trying to solve this enigma of nature. There are many theories that attempt to explain the mechanisms of memory. It is believed to be based on biochemical and electrochemical processes. Evidently, this problem will be solved in the not-too-far future.

Human memory suffers in many diseases, mostly vascular ones. For this reason some scientists believe that age and age-dependent vascular changes are one of the most frequent causes of impaired memory. However, this is contradicted by the fact that many old people still retain a good memory; they remember perfectly well all that happened in the past, as well as everything that happened not long ago or is taking place at the present moment.

Some people, especially elderly ones, only appear to have an impaired memory. This may be due both to a lesser ability to focus their attention and to impaired hearing. An apparent deterioration in memory may result from a person's losing interest in the surroundings, from absent-mindedness, from poor powers of observation. Lately, it has been proved that bad memory can result from disturbed sleep, because during normal sleep necessary information is selected and fixed in the brain.

Drugs alone will be of small help in such cases. One should continually train one's memory to keep it in "good shape". One must also train one's attention and powers of observation, and there must also be some interest in remembering some thing. Certain diseases, or separate symptoms of a disease, may affect the memory. For example, if one becomes centred on one's disease and interest in one's surroundings flags, one comes to regard many factors as of minor importance, and does not remember well anything that concerns them. This does not mean that one's memory is actually impaired. A lot depends on a person's character, on whether he or she is suggestible and purposeful. The same can be observed in cases of headaches and dizziness.

Incidently, our patients very often complain of dizziness (or vertigo). Usually they use this term to denote a wide variety of sensations. And indeed, the manifestations of dizziness are as diverse as its causes. True dizziness is the sensation that the surrounding objects are revolving around you, the feeling that your own body is rotating. This is the so-called systemic vertigo. To such a patient the objects around him or her appear to be moving, or the patient's own body seems to be changing its position. These sensations may be of different nature: one may have the impression that the floor is revolving or slipping from under oneself, or that the walls and ceiling are revolving, the bed rotating, swaying and shifting, etc.

The main cause for such dizziness is a disease of the vestibular apparatus. Attacks of dizziness are always a very distressing experience, because they are usually accompanied by a feeling of fear, nausea, and sometimes, vomiting. There may also be various vascular disturbances with wide fluctuations in the blood pressure. Changing the position of the body is especially conducive to bringing on an attack of dizziness.

The fact is that the vestibular apparatus is a whole system that continuously analyzes the position of the head, (and not only of the head) in space. The vestibular apparatus coordinates the relative disposition of different parts of the body in space so that the body retains its equilibrium in every position. The main signaling device is lodged in the canals of the temporal bone and consists of three structures placed at different angles with respect to each other. In shape they are surprisingly similar to the well-known carpenter's level. Any changes in the position of the head lead to the displacement of a special fluid that these canals are filled with. This stimulates the nerve endings, and the resulting impulse is transferred along the nerve fibres to various parts of the brain and the spinal cord. The nervous system continuously analyzes these signals and immediately makes the necessary corrections in the muscular system. This is a high-precision device, somewhat like an autopilot for every situation.

The vestibular apparatus often suffers in ear diseases. However, the vestibular apparatus does not consist only of the arrangements in the canals of the temporal bone. It also includes the nerve fibres that run to the central nervous system, as well as the whole complex of nervous connections that ensure this necessary function. Consequently, such disturbances may also occur in various diseases of the nervous system when different parts of the vestibular apparatus have suffered. This may happen, for instance, in vascular or infectious diseases of the nervous system, as well as in many others.

Besides systemic vertigo there may also be non-systemic vertigo. Possibly most of the complaints of dizziness refer to the latter. But in this case the complaints are different, and they include a wide variety of sensations. There may be a feeling of instability in the head when moving, swaying, or swimming. When the patients feel faint, have nausea, or when everything swims before their eyes, they often call these sensations dizziness. But in all these cases they do not have the false but distinct sensation that the surrounding objects revolve around them, or that their own body rotates. When patients with non-systemic vertigo complain of dizziness, they often cannot describe just what they actually feel. Such sensations often prove to be of psychogenic origin.

Attacks of systemic vertigo (as well as of non-systemic vertigo) may last from a few minutes to several hours. They are especially typical, for instance, of the well-known Meniere's syndrome, characterized by sudden vertigo with nausea and vomiting, and often noise in the ears. Patients with this disease may lose their balance and fall. This is the result of periodic vascular disturbances in the region of the canals in the temporal bone, which go under the general name of the labyrinths.

What should be done if a person suddenly feels dizzy? If this is the first time that it has happened, the patient ought to go to a doctor's for a check-up. But if this is not the first time, and the patient knows, in the main, what causes these attacks, he or she should lie down where there are no disturbing bright lights. It helps to put a hot-water bottle by the feet and mustard plasters on the calves of the legs. It also helps to take a belladona pill. Aeron, a medicine for sea-sickness, sometimes also has a good effect. Patients with some experience usually feel an attack coming on and know what measures to take.

As I have already mentioned, not all the complaints with which patients come to neuropathologists are actually due to primary disturbances of the nervous system. Here are several examples in illustration.

I was once consulting a thirty-two-year-old woman who complained that over a period of several months she had gradually been "losing her voice". Her voice was, indeed, low and hoarse. The patient told me that from time to time her voice returned almost to normal, but that her condition had a general tendency to grow gradually worse. In addition, careful questioning revealed a number of details that the patient had not connected with "losing her voice". Lately, she had noticed that walking had become difficult and that she tired easily. Sometimes she would feel so weak that she could hardly stand. And there were other signs, such as small muscular atrophies in the region of the shoulder girdle and weakness in the hands, where little hollows had developed between the knuckles. Examination showed that when the patient extended her hands in front of her they trembled rhythmically (there was a tremor). Also, her eyes were unnaturally bright. Although there seemed to be no visible enlargement of the thyroid, I sent the patient to an endocrinologist.

It soon became evident that all these symptoms were caused by hyperthyroidism—the over-active functioning of the thyroid gland. After being treated for several months by an endocrinologist, the patient got rid of all these symptoms.

Diseases of the endocrine system are quite often accompanied by disturbances in various parts of the nervous system. Thus, it is not rare for diabetic polyneuropathy to be first discovered by a neuropathologist: the patient, who never suspected that he or she suffered from pronounced diabetes, comes to the neuropathologist with complaints of weakness in the legs. This feeling appears at quite an advanced stage of the disease and almost always means that the patient has paid no attention to his or her condition and for a long time just endured poor health. The combined efforts of an endocrinologist and a neuropathologist can sometimes help.

Not only the increased functional activity of the thyroid, but its reduced activity (hypothyroidism) as well can lead to disturbances in the nervous system.

Both increased and reduced functional activity of the parathyroid gland also almost always cause considerable disturbances in the neuromuscular system.

The endocrine system (each of its components) is extremely closely connected with the functioning of the nervous system. Because of this, any disease of the endocrine system results in some kind of disturbance in the nervous system. Often diseases of separate endocrine glands give rise to affections of the nervous system that are regarded as primary neurological diseases. Thus, for instance, a disease of the thymus can lead to the development of myasthenia—a very grave affection of the neuromuscular system.

Naturally, diseases of the nervous system that are, to some extent, brought about by lesions of various structures of the endocrine system should first of all be treated by an endocrinologist, but in consultation with a neuropathologist in every case.

Thus, in the course of his practice, every neuropathologist is confronted with extremely complicated diagnostic problems. The most difficult ones are mainly those that lie at the junction of different branches of medicine.

An ambulance once delivered a youth of eighteen to the department of neurological diseases of a hospital. The boy had suddenly fainted in the street, and had violent convulsions, with frothing from the mouth and disturbed respiration. He came to in the emergency department. His blood pressure was high. Soon he again had convulsions, but this time they were restricted to the right hand and foot. After this he once more lost consciousness. At first it was assumed that he had epilepsy. An investigation of the fundus of the eye and the results of encephalography made us suspect that he might have a tumour of the brain. But an hour later we received the results of his blood and urine analyses, and there was no longer any doubt. The nervous disorder was of a secondary nature and caused by a kidney disease—acute glomerulonephritis. The patient was moved to the nephrologic department and soon recovered.

Such affections of the nervous system not infrequently develop as complications of a number of chronic kidney diseases and diseases of the urinary tracts.

It is also not so easy to distinguish hypertensive disease from arterial hypertension resulting from vascular lesions in the kidneys. In a word, disturbances in the functioning of the kidneys, whether they lead to the retention of waste materials and various salts, or to the excessive elimination of salts that the body needs for its normal function, can always lead to changes in the nervous system. These changes have a very wide range of clinical manifestations: from general weakness, irritability, drowsiness or insomnia, to sudden grave conditions like the one described above.

Many diseases of the stomach, intestine, and especially of the liver and biliary tract, are also accompanied by headaches, drowsiness, and general irritability. The so-called bilious disposition evidently has its origin in pathology.

And this is quite natural, because there is a feedback mechanism: the functioning of all the organs and tissues depends, to a great extent, on the state of the nervous system, just as the nervous system cannot function normally if the activity of the internal organs is disturbed. Thus, any attempts to cure disturbances of the nervous system (sleep disorders, headaches, increased reactivity) due to diseases of the liver or stomach, for instance, will have little effect if the basic diseases are not cured first.

Even gynecological diseases, which seem to have nothing in common with neurology, can cause a number of neurological disturbances. This almost always happens at the time of menopause. A wide range of neurological pathologies may develop during this period, from emotional instability and neuroses to various manifestations of vascular disturbances, including impairment of brain circulation. Incidentally, contrary to general opinion, men also experience a climacteric, though in a milder form and with other manifestations.

Even young women can have complications involving the nervous system, which may be caused by a number of gynecological diseases. These include, for instance, sciatica and neuritis of the femoral nerve in cases of inflammation of the uterine appendages, disturbances of the normal function of the autonomic nervous system, neuroses, and even inflammatory diseases of the brain and spinal cord in some cases.

As you see, there indeed seems to be no limit to the range of problems that a neuropathologist encounters.

About a hundred years ago, childhood neuropathology became established as a separate branch of neuropathology. A child's organism has its own special features: all the processes are not as stable as in an adult organism. Continuous development of the metabolic processes is taking place, as well as adaptation to environment and diet (which is the reason for the variously manifested allergies that are so common in childhood), pubescence, etc. All these factors modify the manifestations of diseases of the nervous system. As a result, these manifestations definitely differ from those seen in adults, even when there is the same diagnosis. These differences are most pronounced in the earliest years of childhood. It is not without reason that there is such a branch of neuropathology as microneuropathology, which is concerned with the study and treatment of pathologies of the nervous system in the newborn (in their first year of life). I should also mention here that there is a whole series of typically "children's" diseases that are relatively rare in adults. They include quite a few diseases of the nervous system.

Pathologies of the nervous system in children differ significantly from such pathologies in adults, as do the treatments for these states in children and adults. This has resulted in there being separate neuropathologists for children and for adults. However, I don't believe that these two sections of a practically single branch of medicine should be completely delimited. A doctor should be acquainted with all the diverse manifestations of the patient's pathological states and their transformation with age.

A large part of the work of a neuropathologist is concerned with various hereditary diseases, including hereditary diseases of the nervous system. The greatest number of hereditary pathologies is seen in childhood, and their forms are extremely varied. Here we have the so-called chromosome diseases due to changes in the structure and the number of chromosomes (mongolism, or Down's syndrome, is the most widely known of such diseases) and hereditary metabolic disorders, i.e. various disturbances of fat, protein and carbohydrate metabolism that often lead to idiocy (amaurotic family idiocy, or Tey-Sach's disease, for instance), to the development of galactosemia with lesion of the liver and lenticular opacity, and to diabetes with all its consequences. The disturbance of bile pigment metabolism, which is responsible for haemolytic jaundice of the newborn and many other diseases, also belongs to the same group.

There may also be hereditary impairment of immunity that results in the development of a number of serious infectious diseases. There are hereditary diseases with primary affection of the endocrine system or the kidneys, diseases of the blood and of the eyes. And all these diverse disturbances significantly affect various parts of the nervous system.

The objective of the neuropathologist in such cases is not only to make a correct diagnosis and confirm the fact of the disease. In spite of the seeming fatality of such diseases, he must still do all that he can to cure the patient. Of course, the present state of science does not always allow to attain any real improvement in cases of hereditary diseases. In certain diseases only future developments in genetic engineering might make it possible to correct the errors of nature.

But there are certain things that can be done already today. For instance, considerable success can be achieved in the treatment of certain hereditary pathological processes due to metabolic disorders. The results of research on metabolic disorders present hopeful prospects for the treatment of muscular dystrophies of various origin, including hereditary ones.

In conclusion, a few words follow concerning the effectiveness of present-day treatment for diseases of the nervous system.

The overwhelming majority of such diseases can be cured. But there are also certain diseases that have aftereffects of lesser or greater severity. Unfortunately, there are also a number of diseases for which we still have no effective treatment, but such diseases are extremely rare (they were discussed earlier). Everyone knows that there are effective medicines, such as antibiotics, for instance, for a number of diseases caused by bacteria. But they act only against bacteria and have no effect on viruses. Using antibiotics without necessity is bad for the patient's health, often leading to the development of yet another, already drug-induced, disease. There are also medicines with a more "focused" action. They can correct a certain function, affect separate symptoms, and stimulate the restoration of specific functional relationships in the body. Such drugs are always prescribed when necessary.

But, first of all, one should always remember that every organism is a powerful self-regulating system that can often cope by itself with very many disturbances, more rapidly with some and less rapidly with others. The purpose of most drugs is to promote a fuller use of the body's natural defence mechanisms. And this is successfully achieved with the correct and competent choice of medicines. But it also requires patience and time: there must never be any hurry. On no account should the dynamics and interrelations of functional reorganization, which has its own regularities, be disrupted. Any attempt to speed up this process is always fraught with the possibility not only of the opposite effect, but of complications as well. The course of every disease has its own special features.

"It takes seven days to recover from the flu without treatment and only a week with treatment...". This well-known joke is not far from the truth. How often we believe in what we would like to believe. Sometimes we think that it was the medicine that helped, not knowing that it had nothing to do with our recovery, that it was the organism itself that coped with the disease in the alloted time. Naturally, this is not true for every disease. But, in every case, a number of physiological functions need to be corrected, including those of the cardiovascular and other systems, and complications must be prevented. This can be done not only with drugs. Sometimes it is sufficient to get some good advice, to follow a proper regimen, and to perform some elementary procedures. What's wrong with using grandfather's old fur coat for keeping warm when you have the flu? It may sometimes have as good an effect as aspirin, which can cause grave complications at times. But there are drugstores in today's world of urbanization and standardization, and the "patients" and their friends and relatives rush straight off to them, because having faith in medicines—in the magic bullets that kill diseases—is also one of the maladies of our age.

In the rare cases when the ailment proves incurable, the patient should look the facts in the face and adapt himself to living and working under this new condition. But on no account should the treatment be stopped, because sometimes only a long and stubborn fight against the disease can help to achieve as complete a rehabilitation as possible. In some cases patients have to remain under treatment all their lives, but even then one can and should always try not to give up, whatever the conditions. Experience shows that this is possible in most cases. Many badly disabled but courageous people have proved this. And if you just look around you, I am sure that you will notice other cases in which people showed great courage.

Good health is such a relative thing that it still has no precise definition. I have even heard quite a reputable scientist give the following definition: "Good health is the state between two illnesses." It sounds rather like the truth, but is essentially wrong, because good health is always an optimistic concept.

So diseases can be cured in most cases, but there may remain some aftereffects. A lot depends on the patient, on his or her outlook. One often sees two patients with the same disease, the same symptoms pronounced to the same degree, but one of them has become completely absorbed in his illness and has no other interests, whereas the other, still continuing treatment, has finished college, works, is full of plans for the future, has married and has children. But the first patient does not marry: he or she puts it off until the time of complete recovery, when the slightest, the tiniest symptom will disappear. The patient is afraid that the disease might affect his or her children, and has become convinced that he or she has no right to have a family. It is very difficult to overcome such self-suggestion. Even explaining such elementary things as the fact that acquired diseases are not passed down to one's children does not work in every case.

Modern science allows one to produce a lot of drugs that can affect even a person's mood and change the level of his or her activity: increase it, or decrease it, etc. But we also know that medicines are something that should be used only when strictly necessary. But, oh, how often people have to be reminded of this!

Sometimes, unfortunately, one also has to remind people that medicine is not yet omnipotent, and that doctors are not gods. For instance, methods of treatment have been worked out today that allow one to check the further development of diseases that always had a tendency to progress. But only to arrest further development. Regression of lesions of the nervous system is impossible in many instances, because, as we know, there is no regeneration of nerve cells.

But even controlling a progressively developing process is already a great achievement. Quite often the organism reacts with compensatory rearrangements, and presently the patient begins to feel a bit better. At first, the patient is naturally overjoyed at this stabilization of the disease and a certain improvement in his or her condition. But after a while the patient desires further improvement, which is only natural. He or she begins to seek "the newest, the most potent" medicines, and finally turns to quacks. And with what result? The result is always the same: at best it is the usual disappointment. But in some cases the disease may get worse, start to develop again, and sometimes it may already prove impossible to stop its progress.

Various "homemade" theories of the type that recommend some narrowly restricted, unbalanced diet, or fasting without medical control, as treatments for a disease do a lot of harm. Some people become raw-food fans and eat all their food uncooked, or suddenly become vegetarians.

Such extremes never do any good. The fully developed organism has a precisely-adjusted stable metabolism based on a regular complete diet that includes carbohydrates, proteins and fats from various sources. Any abrupt changes in dietary regimen or composition, or a narrowly restricted, unbalanced diet always have undesirable, and sometimes disastrous, effects. In general, any extreme, any one-sided approach is fraught with grave consequences even for a healthy person, the more so for a sick one.

And one more warning. We know of the importance attached to sports, and of the great popularity of physical exercise. All this is very good, because exercise is indeed the key to health. But some people carry their enthusiasm too far. What I mean is that against their common sense, such people often subject themselves to overstrains. Naturally, I am not speaking of sportsmen, whatever their particular field. I mean amateurs, who in their just rebellion against hypodynamia, one of the evils of civilization, go from one extreme to another. I whole-heartedly welcome the wish to move more, but would like to remind you: physical exercise is beneficial only if practiced rationally.

Today, there exist all sorts of devices, training simulators, bicycle ergometers and many other things, and new equipment is being invented all the time. Some inventions verge on the ridiculous. For instance, in the USA, where children spend a lot of their free time in front of the TV screen, one resourceful father built a bicycle simulator with a dynamo and connected the TV set to it. Thus, if his child wanted to watch the TV, he just had to pedal!

This does not solve the problem, of course. It is just the same kind of extreme as jogging without limits. Many people believe in the maxim "the more, the better"; meanwhile, the following case is well known to specialists. Jimmy Carter, when he was the President of the United States, fainted during one of his daily jogs. Sudden cardiac insufficiency proved to be the cause. This phenomenon is now called "the Carter syndrome".

Physical development should never be one-sided. Everything is beneficial: jogging, morning gymnastics, walking, aerobics. But all types of exercises should be combined in proportion and done according to one's capacity, with no overstrain. This is why one should always consult a doctor before going in for any kind of sport.

Take, for instance, jogging, or aerobics, which are so popular. There are contraindications for both of them, such as recent concussion of the brain, or any other disease of the central nervous system, a mobile kidney, visceral ptosis, hernias, certain heart diseases, etc. But there are practically no contraindications for dosed walking. Some specialists claim that walking barefoot yields the best results: they assert that walking barefoot stimulates the activity of all the internal organs.

But, even in this case, one should consult a doctor before going in for walking, because only a doctor can take into account all the special features of one's state of health and can recommend the necessary complex. When some type of sport is chosen without consulting a doctor, and the choice is often based on the wrong idea about the role of physical exercise, the result is that its methods are put to wrong use and it can have a bad effect. This is especially true for people who have suffered from diseases of the nervous system.

Not long ago I saw a piece in the paper about a teacher, a young man, who had been left with paralysis of both hands after Russian tick-born encephalitis. The teacher had decided to try some self-prescribed "treatment". With great difficulty he forced himself to lift heavy irons and other heavy objects with his paralyzed hands. This fact was described with approval. The author of the article emphasized that the teacher was a man of strong character and will. And he seemed to have got quite good results: the described events took place during the recovery period of the disease, therefore, naturally, some of the movements were restored. I know nothing of the subsequent fate of this young man, but I know of many other cases of this disease, in which the patients had the same residual effects. Some of them also tried to overcome, to cure their paralysis by lifting heavy loads. But instead of getting better, the process often became acute and developed further. As a result, the already existing paralyses got worse and new ones developed. On no account should there be any self-treatment in such cases. Any doctor who is a specialist on these diseases knows that it is precisely in such cases that physical loads and excessive physical exercises are contraindicated. The patient often pays dearly for disregarding his doctor's advice.

Why is self-treatment so common? There are obviously many reasons for this. To a certain extent, it is traditional: people have treated themselves from time immemorial. In addition, going to a clinic is not a very pleasant procedure. It takes time, the staff are often not sufficiently attentive to the patient, and there are also a number of other inconveniences. Besides, today's patient is intelligent enough to attempt to analyse both his own illness and the possible treatments offered by modern medicine with the aid of the necessary books. This leads to no good, as a rule, because identical symptoms may be either the result of a slight disturbances or the first signs of a serious disease. Only a doctor with wide professional experience can determine their real nature.

Today, the medicine chest at home contains not only a collection of the latest drugs, but also a number of curative objects. There may be an ebonite plate that is used for rubbing the skin over the place where it hurts. This is done in an attempt to create a more powerful electric field, so as to get an analgesic effect. Some people keep large copper coins, to stick them with sticking plaster over the painful areas. Others have a metal chain as well, which they use at night to "ground" themselves via the central heating to get rid of "surplus" electricity. And the list continues. Along with things that are absolutely useless, there may be others that are not so irrational. For instance, it was once fashionable to wear magnetic bracelets. They were used, and quite often successfully, against hypertension. Incidently, methods based on the magnetic effects are widely used today. But this is also no novelty. It has been established that the ancient Incas used them: they touched symbolic figures made of minerals that had magnetic properties. These statues still exist today.

In a word, the contents of the medicine chest more or less reflect the state of affairs in self-treatment as a whole: both are characterized by extreme chaos.

Let me take the occasion to caution you once more: without medical advice do not use either drugs, or any other curative measures recommended by non-professionals!

The following is a short report from the magazine "Knowledge is Power". I am sure no comments are needed.

"Not long ago a museum of quack remedies was opened in the American city of St. Louis. On display are various bottles with "magic potions" for practically every disease. Among the exhibits there is a "spectrometer" that is alleged to cure any illness, from cancer to diabetes. One only has to switch on a hundred-watt lamp and attach a light filter (a specific colour for each illness). There is another device—a musical one. Its electrode vibrates in time with a certain rhythm and systematically touches the sore place. The "inventions" on display in the St. Louis museum are kept behind glass, but visitors still manage to pinch the exhibits, or to unobtrusively swallow the pills displayed on its shelves."

And a final remark. Unfortunately, doctors in every specialty still face a lot of problems. All of them are connected, to some extent, with effects on the nervous system. This eventually brings the patient to the neuropathologist's consulting room.

In Vino Veritas!

Notice that alcoholism (dipsomania, drunkenness), as well as all other types of narcomania, are designated by one word—vice.

From ancient times drunkenness was considered worse than any of the "seven deadly sins": pride, covetousness, lust, anger, gluttony, envy, and sloth. Evidently, this is why all religions disapproved of it, condemning it (as in the Christian faith), or even completely forbidding the drinking of any kind of wine (as in the Muslim faith).

Just remember the Bible: our forefather Noah was drunkard number one. Having drunk his fill of fermented grape juice, he fell asleep naked among the vines, to the great embarrassment of his sons, Shem, Ham and Japheth. They were so ashamed of their father that they approached him with their backs turned so as not to see such shame, and covered his nakedness with primeval rags.

But you may argue that wine is used in certain religious rites, for example, by the Catholics and the Jews, as the symbol of "God's blood". Does this mean that religion is not against drinking wine? No, it doesn't! Wine is used on very rare occasions in religious rites, and even then, not in every religion.

But why have I suddenly turned to religious canons? I have done this because the biblical parables and postulates in many respects reflect in summarized form the enormous empirical experience accumulated by hundreds and thousands of generations of mankind. This experience, though it has no scientific basis, is sufficiently fundamental as regards its applied aspects. Thus, the experience of many generations shows that drunkenness, whether in pronounced or moderate form, detrimentally affects the intellectual functions and often leads to the development of very serious disturbances of the nervous system and the internal organs.

Jack London, the great American writer considered that drunkenness, the offspring of barbarism, held mankind in a mortal grip since hoary and savage anciency and collected a monstrous contribution, devouring youth, undermining strength, stealing energy, ruining the flower of the human race. One can quote the opinions of many great men, from ancient times to the present day, each of whom individually but unanimously declared that "man is often his own worst enemy" (Cicero) when he drinks. The great German poet Heinrich Heine wrote that in the bottles he saw the horrors that would be born of their contents; he felt that before him were bottles with monsters, snakes, and embryos in a museum of natural science. And as if calling to him over the centuries, Pythagorus, that ancient sage, states: "Drunkenness is an exercise in madness". Drunkenness is not just a personal vice. It affects the entire society, has an effect on mankind as a whole. It is not for nothing that Wolfgang

Goethe wrote as far back as the last century: "Man could have achieved stupendous successes had he been more sober". Many years have passed since then, but it looks as if this evil has settled firmly on our planet.

Much has been written about drunkenness, about its social and medical aspects. It has also been established that drinking any alcoholic drink is detrimental to the intellect, leads to the deterioration of memory, reduces the ability to correctly assess one's actions, and makes one overestimate one's importance and personal abilities. All this and a lot of other things are true not only, and not so much, for the stage of intoxication itself, as for the following, absolutely sober state. One can repeat this without end, but the awful thing is that many of those who drink (unlike those who do not) are evidently already unable to realize that all this is absolutely true for their own case; they are unable to realize this because they have already "crossed the Rubicon" and the results of drink have already begun to tell upon them.

For a long time I worked together with my teachers, the eminent Soviet neuropathologists Academicians A. M. Greenstein and Ye. K. Sepp. Neither one nor the other ever drunk any alcoholic drinks. Once, when somebody asked Academician Sepp at his jubilee celebration why he didn't take a few sips even on such a great occasion, he gave a very clear answer: "Because I hold the greatest creation of nature—the brain—in high esteem, and do not want to disrupt its work." Academician Greenstein's attitude to wine was the same. And this was only logical, because both of them were magnificent doctors and had devoted their lives to the detailed study of the nervous system.

I remember one of Dr. Sepp's rounds. The patient, a forty-year-old man, an engineer by profession, sat in a wheelchair. His right hand and foot were completely paralyzed, the right corner of his mouth was pulled down. He was left-handed, therefore his speech had not suffered. A long time had passed since the onset of the illness—almost half a year. Because of this there was little hope of complete recovery.

Ye. K. Sepp questioned him about the beginning of his illness. The patient, showing off, recounted with an indulgent smile: "It happened in Odessa, in a beer-house. We were drinking beer "with a flip": after each mug of beer we drank a small glass of vodka, and took some salted fish with it. After the fourth or fifth mug I suddenly discovered that I couldn't lift my right hand to pick up the glass of vodka."

"And what did you do then?"

"I picked it up with my left hand and continued drinking..."

"You didn't stop?"

"But the others were still drinking! Afterwards I couldn't get up, because not only did my hand not work, but I couldn't move my foot as well. An ambulance took me straight to a hospital."

I have reported this dialogue word for word, omitting only the foul language, which our patient used without blushing, "just so, without any meaning, just to round it off", as he expressed it.

It is not rare to get such lesions of the nervous system from drinking alcohol, especially if the person drinks systematically. But what had happened to this patient, why had he suddenly been paralyzed? The reason for his state, I am sorry to say, was one that is encountered quite frequently: he had suffered a stroke, i.e. there had been a disturbance in the circulation in one of the large main cerebral blood vessels.

As a rule, alcohol makes the blood vessels age rapidly, even in young people. The vessels become sclerotic, their lumen grows narrower, and the vascular walls become fragile. As a result, a vessel may rupture and a cerebral haemorrhage occurs, causing compression of the brain and thus damaging it. The changes that take place in the blood vessels (the narrowing of their lumen, the changes in the viscosity, and the coagulability of blood) often cause their occlusion by a blood clot (thromboembolism). On account of this the region of the brain that was supplied with blood through this vessel no longer receives blood, and, as a result, perishes very rapidly. It is already practically impossible to restore activity in this region.

Practice shows that disturbances of this kind, which develop as a consequence of drinking alcohol, are difficult to cure, especially if they occur not for the first time.

The use of alcohol, especially its abuse, is often the cause of a wide variety of lesions of the nervous system. But both those who drink, and those who don't, know very little about them. Because of this among people who drink there is a traditionally lenient attitude not only towards "moderate" drinkers, but towards chronic alcoholics as well.

I am sure that you also have often heard the following "ironic" remark from people coming up to the bar to order a drink: "Come on, let's have some poison!"

In spite of their scepticism, these people are not far from the actual truth, because alcohol is indeed a poison. Moreover, it is also a real narcotic. And it is the nervous system that suffers most from it.

Almost everybody has personally experienced its effects.

The gulp of an alcoholic drink, having burnt the oral mucosa, passes down the gullet into the stomach. The burn suffered by the mucous membrane of the oral cavity, the tongue and the gullet causes sharp irritation and injury to the nerve endings. As a result, taste sensation changes and preconditions for disturbing the proper functioning of the stomach immediately develop. The burn suffered by the stomach walls is not felt so clearly, but the harm done by it instantly becomes evident and is not always repairable. Then the alcohol passes into the bloodstream and has an immediate adverse effect on the function of the blood vessels. As a result, the blood supply to every organ and tissue changes; the nervous system suffers most of all. The liver is forced to correct the rash action of its owner and perform its main function, i.e. neutralize the imbibed poison. Both the kidneys and the urinary tract, which take part in eliminating the remaining alcohol, are also not spared.

Speaking of the affections of the nervous system caused by alcohol, I intentionally described its effect on the internal organs, because the activity of the brain depends, to a great extent, on the state of these organs. The development of lesions in the stomach and the intestine prevents the delivery of vitamins (primarily of the vitamin B complex) into the bloodstream. Without these vitamins, neither the brain nor the blood vessels can function normally. It has also long been known that the state of the liver affects the functioning of the brain. This has been proved by many of I.P. Pavlov's disciples. Hundreds of books have been written on the relationship between the state of the liver and the functioning of the brain.

We know that alcohol aims its main blow at the nervous system. This is evidenced by the fact that the concentration of alcohol in the cerebrospinal fluid that continuously circulates around the brain is always twice as high as its concentration in any other organ. And the damage caused by the alcohol is multiplied many times by lesions in the internal organs, on the activity of which the brain is so dependent.

Besides this, the intake of alcohol is regularly followed by a drop in blood sugar, and symptoms of hypoglycaemia develop. This immediately influences the functioning of the nervous system and the condition of all the blood vessels. This, in its turn, simultaneously increases the appetite (in order to make up for the deficiency of glucose and other substances). That is why drinking is so often accompanied by overeating with all its consequences. At the same time there develops a sharp deficiency of vitamins in the body, first of all of the vitamin B complex (B_1, B_6, B_{12}, B_{15}, nicotinic acid, etc.), without which the nervous system is practically unable to function normally.

Repeated drinking aggravates all these disturbances considerably. Finally, sooner or later, various signs of impairment of the nervous system become evident, and as I have already mentioned, it is not always possible to combat this successfully. But why not, you might ask. Hasn't modern medicine got a wide range of drugs, vitamins included, which ought to help in every case? But the fact is that they do not help especially in cases when the alterations in the nervous system, as well as in the liver, have become irreversible. These changes can be clearly seen under the microscope on investigating the organs and tissues of people who have died of alcoholism. If the nerve cell has perished (whether from the toxic effect of alcohol itself, from avitaminosis, or from impaired blood supply), nothing can restore or replace it. If it is the sheaths of the nerve fibres (without which the nerves cannot function) that have suffered, they can be restored in far from every case. One of the reasons for this is that the metabolic autoimmune disturbances that take place with every intake of alcoholic drinks are very profound here and involve several systems of the body. The immune system suffers every time, so people who abuse alcohol fall ill much more often, and with infectious diseases in particular. They also suffer from varied and unusual allergic diseases, sometimes in the most unexpected form (unfortunately the causes of this pathology of the immune system have not yet been thoroughly studied).

I once treated a patient over a long period of time who suffered from a peculiar form of allergy. It was enough for him to swallow just a mouthful of corn vodka to get a skin eruption soon after, which often merged into brownish islets of puffed skin. These islets were of irregular shape. They itched and did not disappear for almost 24 hours. At the same time his lips swelled, becoming about one and a half times as thick as normal, and turned crimson red.

This depressed him profoundly. He felt "absolutely abnormal" (as he put it). He had tried countless treatments, offered both by official medicine and "folk" medicine. After trying each treatment, he would drink alcohol to see if the treatment had been effective. But not one of the treatments helped him. He was so set on getting rid of this "allergy to vodka", that he regarded the simple advice to stop drinking as insulting. He was ready to poison himself with any quack medicine to get rid of this "ailment".

This kind of allergy is rare, and the reaction may vary depending on the alcoholic drinks. For instance, I have observed the allergic reaction of a famous singer to cognac in the form of an acute spasm of the glottis. I have also observed a more common reaction: swelling of the lips after drinking dry and fortified wine, and other wines. All these are individual reactions, variously pronounced and dependent on many factors. But why first cultivate such a defect and then try to cure it, when the solution stares one in the face, so to say?

The most widely known and the most frequent of diseases of the nervous system caused by drink are alcoholic polyneuritides (or polyneuropathies, as they are now called more correctly, which in direct translation means "multiple suffering of the nerves"). This disease develops imperceptibly, gradually. At first there may be all sorts of tingling sensations, or "creeping" sensations, in the hands and feet, sometimes in places on the torso. The feeling somewhat resembles "pins and needles". There may be either very intense pains or transient, quickly subsiding ones. Sometimes there is hyposensitivity of the hands or feet. Almost simultaneously a growing weakness develops in them. In some cases, this weakness develops at once, without previous pains or other disturbances of sensation. Usually this weakness in the hands and feet grows quite intense. The patient's hands and feet no longer obey him, and the difficulty encountered in walking and in using his hands is as great as in deep paralysis.

The peripheral nerves are also subjected to the toxic effect of alcohol, especially those very delicate small nerve trunks that run right up to the muscles. They lose their myelin sheaths and the fibres of the nerves themselves degenerate. The muscles, deprived of their innervation, gradually become atrophied and also degenerate. In many cases it is already practically impossible to reverse these changes with the aid of drugs, and even the administration of vitamins will have no effect.

I once had a patient who suffered from extreme avitaminosis of the kind that is seen only in people after prolonged starvation. This happened 15 years ago.

The man, unshaven, his face emaciated, lay on his back. His nose protruded sharply, his deeply sunken eyes glittered. He spoke in a low, slightly hoarse voice. His feeble hands lay at his sides, his feet were motionless. There were nearly no muscles left on both hands and feet; it was even difficult to define their contours. The patient could only turn his head from side to side, but could not lift it from the pillow.

Even before examining the patient, during my talk with him, I noticed that the skin on the backs of his hands had an unusual appearance: it was dry, with cracks and greenish scales. I had never seen such hands before, only read about them. In old medical handbooks this condition is described in detail, whereas in current ones there is usually only a brief reference to it, because already for many years starvation has not occurred in this country. This was the sign of pellagra, i.e. the consequence of very severe avitaminosis, which is due to a deficiency of the P-P factor (nicotinic acid). The clinical manifestations of pellagra consist of three main signs, or the three D's, as we call them: dermatitis (specific skin lesions), diarrhea and dementia (a psychic disorder in the form of mental deficiency).

In this case, the three D's were present. Here we had a case of extremely complex avitaminosis, including vitamin B_1 deficiency, which gives rise to a very severe form of polyneuritis.

How had this patient degenerated to such a state? He answered willingly, obviously showing off and smiling all the time, though it was difficult for him to speak. Self-criticism concerning his condition was markedly reduced: "Well, so it happened, and what of it? It's nothing to speak of!"

A cobbler by profession, he had taken out "a licence" and worked alone. He had been drinking already for many years; had had bouts of hard drinking. But lately he had started drinking not less than a bottle of liquor a day. Formerly, he would have a "normal" snack with his vodka, but then began to eat only black bread, sometimes with salt. And lately, he was drinking without taking any food with his drink.

I am sure no comments are needed. Of

course, this case is an extreme one, but *polyneuritis potatorum* (alcoholic neuritis) is, nevertheless, not uncommon. And it need not be vividly pronounced in every case, with immediate complete or partial paralysis. In most instances, the person suffering from this disease does not seem to have any locomotor defects. But there already exists a certain predisposition in an occult form, a heightened vulnerability of the nerves, which function at their limit. In such a condition it is enough for the slightest factor to affect the nerves (a light contusion or compression of the nerve, supercooling, a chance poisoning, any infectious disease) to cause sudden locomotor disturbances and paralyses. It is not even necessary to be a chronic alcoholic to have such a predisposition. It is sufficient to drink the usual small glass of vodka every day. The point is that people have different physiological resources, as well as different resistive powers, and detoxifying capacity of the liver, the kidneys, etc.

And this is not all. Various people also have a lesser or greater vulnerability of the nervous system. In certain cases of alcoholic intoxication, alcohol-induced Wernicke's encephalopathy may develop. The causes of this extremely grave brain ailment have been sufficiently fully investigated to date. The initial cause of this disease is chronic alcoholic gastritis (inflammation of the stomach walls) and disturbances of the intestinal function of the same origin. All this evokes a complicated set of metabolic disorders that are aggravated by a deficiency of B vitamins. This leads to the development of vascular lesions in the brain stem and to the affection (the destruction) of certain groups of nerve cells.

The onset of the disease is acute: it mostly starts with a sudden affection of the eye muscles. Sometimes the optic nerve also suffers, and in that case vision becomes abruptly worse. At the same time there may develop facial asymmetry and difficulty in swallowing. Lack of muscular coordination is a frequent symptom, with the result that the patient is not only sometimes unable to walk without assistance, but can't even lift a spoon to his mouth. As a rule, changes in the state of consciousness occur at the same time, and there is mental confusion. The mental disorder may be quite pronounced, up to the development of Korsakoff's psychosis with a complicated picture of memory disturbances. All this is the direct sequel of alcohol abuse.

However, direct affections of the nervous system as the ones discussed above are not the only consequences of alcohol abuse. In a person who drinks, the clinical manifestations of any disease, whether it be an injury, a poisoning, or an infection, differ considerably from the standard clinical characteristics of the respective disease. The same infectious hepatitis is not only more severe, but, as a rule, more frequently has undesirable aftereffects and turns into a chronic disease. This happens because there are drastic changes in the functional state of the liver, which for a long time has been obliged to neutralize the effects of alcoholic intoxication. This state of the liver always affects the activity of the brain. Not only the peripheral nervous system of a person who drinks, but his central nervous system as well, becomes more vulnerable, and a number of pathological changes may occur in them. Everybody has heard of "delirium tremens", which develops as a result of alcohol abuse. In this condition, the patient has terrifying hallucinations, sees all sorts of animals, from flies, cockroaches, and mice to terrible beasts and devils. Thus, in a person who drinks, even if he has never been so drunk as to "see devils", any affection of the nervous system due to infection is often complicated by pseudodelirium tremens, with the same kind of hallucinations and delirium. This seriously aggravates the disease and makes the prognosis worse. In addition, the physician of such a patient is obliged to prescribe additional treatment to eradicate the symptoms of alcoholic affection of the brain. This additional treatment may influence the treatment of the main disease, i.e. impede it. The result is a very complicated conglomeration of several illnesses, and it is no simple matter to identify and to treat them. I must add here that the locomotor disturbances described earlier might also develop, and that there is the threat of future polyneuropathy. So you see, we get a "bouquet" with unpredictable consequences. The complications observed on diseases of the kidneys are no less severe.

The same kind of situation may arise in the case of an injury, intoxication, or even a "simple" respiratory disease, such as the flu, for instance.

All that I have described here was already known long ago. I did not write it under the impression of some kind of novel situation. You will find confirmation of this if you read the works of neuropathologists that were published in the twenties and the thirties (or some years earlier, or a bit later) and also handbooks and reference books on neuropathology. Unfortunately, not much is written about this in popular science literature. In most cases, it is the social aspects of alcoholism that are discussed: the traumatism, hooliganism, personality degradation, reduced working capacity, various mental disorders, and, naturally, the effect of alcohol on heredity, which essentially leads to degeneration.

Such "trifles" as headaches, systemic

vertigo, sleep disorders, and lesions of the autonomic nervous system are mentioned less frequently. But these conditions play an extremely important role in everyday life, both in work and in one's private life. In particular, affections of the autonomic nervous system are frequently implicated in this role.

This part of the nervous system is fundamental for the balanced functioning of the organism as a whole. It ensures what is most important for body for which the term "homeostasis" is used in medicine, i.e. the maintenance of all the activity parameters of the internal organs, the tissues, the metabolism, and the circulation at the critical and very finely regulated level. Any amount of alcohol almost instantly disturbs the homeostasis to some extent, and chronic alcoholism, or even frequent drinking, makes these disturbances strongly pronounced and difficult to cure.

Even minimal amounts of any alcoholic drink give the drinker a feeling of warmth. It is considered that spirits "are warming". But what actually happens? Alcohol disorganizes the work of the vascular centre situated in the brain stem. As a result, the cutaneous blood vessels dilate, and this affects the colour of the skin: it first becomes slightly, and then more intensely, red. At the same time, there is an increased loss of body heat to the environment. And, consequently, despite the feeling of warmth, the body temperature begins to fall after some time, and the body starts to cool. The vascular centre is already unable to coordinate the functioning of the blood vessels, and they become almost uncontrollable. Vascular neurosis develops, leading to variously manifested disorganization of the functions of all organs and tissues, as well as of the brain itself. The signs of impairment of the functioning of the autonomic nervous system can be seen with the naked eye, so to speak: swollen blood vessels on both hands and feet, cyanotic and oedematous skin on the extremities and the face, and pronounced tremor of the hands, tongue and eyelids. All these symptoms are later aggravated by the development of cirrhosis of the liver, myocarditis (inflammation of the myocardium), and sclerosis of the cerebral vessels. It is clear that all this has a very bad effect on a person's health.

Sudden alcoholic epilepsy sometimes happens to be the only terrible sign of impairment of the nervous system. In this case, major epileptic fits occur one after another at different intervals, each attack as if paving the way for the next ones, which already develop with greater ease. Ceasing to drink does not always mean that one will get rid of these fits. The treatment of such patients is prolonged, and its results may not be completely satisfactory.

As far back as 1887, the outstanding Russian psychiatrist S. Korsakoff described a specific psychosis that was often seen in people who drank. This psychosis was named after him and is known all over the world as Korsakoff's psychosis. What are its manifestations? One's memory for all recent events becomes worse; the drinker cannot remember what happened a day or two ago, or a week ago, but even what happened and what he was doing an hour ago. Whereas all that happened many years ago he remembers very distinctly. He is unable to learn anything new. There are confabulations: he narrates fictitious tales about events in which he took no part and which he did not see and makes up all kinds of stories. All this is quite frequently combined with a very severe form of Wernicke's encephalopathy (which has been mentioned earlier).

I want to emphasize once more the main links in the chain of pathological changes: the poisonous effect of the alcohol itself and of those toxins that are formed in the body as a result of metabolic disorders caused by lesions of the liver, the kidneys and other organs; a sharp decrease in blood sugar (hypoglycaemia), a complex avitaminosis, and, finally, the development of disturbances of the immune system and its pathological reactions. All this leads to punctate haemorrhages (and larger ones) that are so frequently seen, to involvement of the brain stem with its vital centres (respiratory and cardiovascular), to damage to the cells of the cerebral cortex, and, finally, to atrophy of the brain and the cerebellum.

It is quite obvious that such profound changes in the nervous system cannot be set right; this is so simply because of the plain fact that nerve cells do not regenerate. The only thing that can be done is to correct certain disturbances somewhat, and even this is not possible in every case.

In the early seventies the distinguished Bulgarian scientists G. Uzunov and S. Bozhinov described extremely severe alcohol-induced affections of the nervous system in children. These affections were not caused by chronic alcoholism, but in most cases resulted from acute poisoning by even small, single doses. Of the 15 children ranging in age from one year and three months to fourteen years, seven had suffered from wine, seven from Bulgarian vodka (rakia), and one from cognac. Some of these children died.

The children had almost the same clinical manifestations as those seen in the adults described above, and autopsy showed similar changes. In those children who survived, the aftereffects were very bad: there was epilepsy, various involuntary forced movements, disturbances of muscular coordination, paralyses, temporary blindness in many cases, and mental deficiency.

The general pattern of affection of the nervous system are identical in adults and children. The nervous system of children of nursing mothers who drink is affected at the earliest age, sometimes irreversibly. Believe me, I am not just trying to frighten you, or to exaggerate. There is no need for this.

It is also a fact that alcoholic personality degradation and frequent, or even rare, instances of alcoholic intoxication lead to sexual promiscuity, and, as a result, to venereal diseases, including syphilis, which also has a drastic effect on the nervous system. It is not uncommon to encounter in the course of one's medical practice combined alcoholic and syphilitic affections of the nervous system. This, unfortunately, is a very grave state, with a most complicated set of symptoms, and it is difficult to get any good results with treatment.

Drinking may have unpredictable and most unexpected consequences. In particular, it has been established that alcohol is a frequent cause of "premature aging", i.e. of impaired memory, changes in behaviour, and deterioration of health. American scientists have found that a number of symptoms that were previously believed to be the result of the natural processes of aging, were actually the consequence of drinking. I have already mentioned the well-established fact that drinking has an adverse effect on progeny, a thing that everybody knows. But the fact that alcohol, after apparently stimulating male virility and female potency, definitely lowers them, is, unfortunately, not so widely known. However, this fact was known to doctors in ancient times, and not only to doctors. It is not without reason that the Koran forbids a man who has broken the commandment to drink no wine to touch a woman for rather long period of time (almost a whole lunar month!).

But you may remark that it is incomprehensible why people continue drinking, in spite of logic, in spite of public and health compaigns; why do people drink even after having read that the intake of any amount of alcohol (even if you are not an alcoholic) always destroys some nerve cells. Do they hope that the 13-51 billions of nerve cells that each of us possess will last a long time? They might not. It's worth keeping all these facts in mind. Recent research with the aid of computor tomography, the most up-to-date technique, has confirmed that considerable atrophy of cerebral cells is found in at least 50% of alcoholics.

I firmly believe that it is better not to do something that is obviously harmful to oneself, even if one's drinking is restricted to minimal amounts. The more so, that it harms not only the drinker but also because diseases resulting from drinking reflect upon one's family, upon all one's near and dear ones, and upon society in general. Whereas it is so simple to prevent all this.

Confrontation with the Times

Some of the Current Origins of Nervous Diseases

We live in an extraordinary age. Humankind flies through space and walks on the moon. Radioelectronics permeates all aspects of our everyday life. Genetics has made tremendous advances in revealing the mechanisms of the development of living organisms, while biotechnology and genetic engineering are occupied in creating biological complexes that nature proved unable to produce in the course of its development. The achievements of various sciences are rapidly introduced into our everyday life and quickly become an absolute necessity. And we no longer notice that all this, besides having other effects, also evokes considerable changes in us ourselves.

It took about four million years for the human race to develop. It is both a derivative and a regular component of nature. Until comparatively recently, everything in nature was in a state of dynamic equilibrium. In the last decade, the established ecological relationships started to break up. There appeared things that had never existed before, such as synthetic materials and petroleum products, and the air became polluted with the products of continuous combustion of various substances. We are literally enmeshed in electric wires, surrounded by electromagnetic radiation, and exposed to many other things. And human beings are forced to adapt themselves quickly to all of them. It is not rare for the acquired blessings to lead to conflicts and to cause diseases, sometimes the most unexpected ones. This is what I mean by confrontation with times.

We shall not discuss global ecological problems here. They can be solved only by the combined efforts of all the countries of the world. Some of these problems are already being tackled; others still await their turn and will not be postponed for too long, one hopes!

But let us return to everyday life: are there no ways to protect ourselves from at least some of the confrontation with it? Of course there are. Experience shows that many troubles could have been avoided if not for our hurry, self-assurance and presumption.

Some time ago, red hair of various shades again became the fashion. Just at that time, a middle-aged woman with fashionable red hair was admitted to our clinic. The tentative diagnosis in her case was encephalitis, i.e. an inflammatory disease of the brain. The woman could hardly walk because of weakness in the legs; she lost her balance all the time. What struck one was the rather unusual course of the disease and the fact that it had already recurred several times.

For a long time we could not establish the origin of her disease, until one day we compared the dates of each subsequent exacerbation. The results surprised us beyond measure: in each case the exacerbation of the disease coincided with some holiday. Exhaustive questioning revealed one more fact: the woman always dyed her hair just before each such occasion.

What kind of devilry was this! Hundreds of women dye their hair with the same dye and nothing happens, whereas here... Incidently, it turned out that our patient had her own method of dying. She used a more concentrated solution than was recommended, and for greater effect covered her head with a plastic cover for almost an hour.

Further on, many things became clear. To dye the hair another colour, the dye must be a potent substance, capable of penetrating into the hair tissue. But it is not intended to penetrate the skin. In this case, the concentration was greater than that usually used. The plastic cover over the head created a hothouse effect: under the cover the humidity increased sharply. As a result, the pores of the skin of the head opened and the toxic substances penetrated into separate parts of the brain. The grave condition of our patient was due to precisely such an affection of certain cerebral ganglia caused by the toxic substances. This happened because of gross violation of the directions for using the dye.

In the following years we often observed such cases, and every time the cause was the same. Of course, individual hypersensitivity to the dye also plays a certain role in the development of such diseases.

From time immemorial, people have used cosmetics to make themselves more attractive. But our predecessors knew nothing of the insidious properties of the simplest chemicals. Some of the most popular cosmetics were prepared with lead and arsenic compounds. And it didn't occur to anyone that it was poisoning with cosmetics that caused many illnesses. This stage is long past, but one should keep this information in mind, so as to avoid making new mistakes. In particular, it is very risky to use homemade cosmetics prepared by amateurs. We all know that there are still quite a number of people who like to try out original compositions, especially "old-fashioned recipes".

Here is one more case, the likes of which were certainly never seen in olden times. When the patient had undressed, it appeared as if she had left her collar on: a reddish, slightly swollen imprint remained on her skin that was an exact replica of the pattern of her lace collar!

"It's so absurd. Whenever I wear this blouse there is always such an 'imprint'. Though it hurts not here, but lower down. I have been told that I have intercostal neuralgia."

A red weal, slightly puffed up at the edges, which looked like the traces of a whiplash, ran along the lower right rib.

No, this was not a case of neuralgia. It was a local allergic reaction of the skin to nylon. This phenomenon is not so rare: some people cannot stand direct contact with certain brands of nylon or other synthetic fabrics. When I explained all this to the patient, she asked me:

"What should I do to avoid this?"

"You should wear only cotton underwear. You have individual hypersensitivity to synthetic fabrics."

People sometimes also suffer from the so-called jeans dermatitis. It is the general name for skin diseases caused by wearing tight jeans for long periods of time. All is well in moderation.

Serious lesions of the nervous system can be caused by the vapours of floor varnish, which is so widely used today, and by many other things. On the whole, it is clear that one should be very careful with all chemicals and chemical agents. And, of course, the instructions for their use should be carried out to the letter.

It is well known that the wide use of radioelectronic equipment can cause quite a lot of trouble. This applies not only to the high level of noise that is so bad for nerves.

The American psychologist J. Desmont showed that certain rock and disco rhythms are very harmful, especially those that sort of "break into" the heart rhythm, are out of time with it. In this case the nervous system always suffers.

The ultra-fast rhythms of deafening music that is played in discotheques, on dance-floors, and at concerts can sometimes even cause concussion of the brain, trauma of the cervical vertebrae, and other injuries. Such cases have been reported in literature time and again. All the described effects are the result of using the benefits of civilization unwisely.

Now and then, one encounters diseases that are caused by the TV that long ago became such an integral part of our life. Some people, especially children who have been watching TV programs for a long time, sometimes get real epileptic fits all of a sudden. They are evoked by a phenomenon that in physics is called a resonance. Such a resonance may develop if the scan frequency response of the picture on the TV screen coincides with the frequency response of the bioelectric potentials of the brain.

For this to happen, there must be a certain predisposition of the nervous system and a specific electrical activity of the brain that differs from that of most people. The readiness for epilepsy is realized, as it were, in such cases. This is one of the reasons why it is recommended not to watch TV from too short a distance.

There may be other causes of metabolic disturbances that give rise to disorders of the nervous system. For instance, there are many people who wish to lose weight and to be slim. They start trying out all sorts of self-styled diets and even go through periods of complete fasting. And what do they get? Various illnesses, of course. Slimming programs should also be carried out sensibly, without amateurish extremes, and certainly under medical guidance. People often do not want to take into account the fact that each person has his own intrinsic genetic type. There may be "big-boned" people and "small-boned" ones. Not without reason does the old Indian proverb says that "be the cow ever so lean it will still not turn into a gazelle".

I consider that some of the most dangerous experiments are those that are tried out on children. Our century seeks to expand human potential, to broaden our knowledge, to "steep" us with information. And some parents hasten to burden their still tiny children with knowledge. A lot has been written about such cases. Many parents already start trying to teach their babies when they are yet only nine weeks old, or just slightly older! What results can one expect? The natural development of the nervous system will be upset, there will be nervous breakdowns at an early age, nervous exhaustion, emotional instability. And in some cases the situation may already be beyond repair. The attempt to achieve accelerated development at the expense of early childhood is also one of the problems of our age.

And, finally, one more thing. One often hears that many of our sufferings are due to the fact that we live in an age of stress. This is an obvious exaggeration. Did not the caveman face stressful situations at every turn in his confrontation with the forces of nature? Do you really believe that when the caveman went hunting bear with primitive flint weapons he experienced no stress?

We only imagine sometimes that life used to be easier. Of course, life today has another pace. But I am not inclined to consider stress as something typical only for our century. One should regard most stressful situations with more equanimity, accept them as natural and even necessary things. It is not for nothing that did H. Selye, the author of the concept of stress, wrote: "Stress is the spice of life."

The author, Professor K. G. Umansky, is a neuropathologist of high repute with many years of research and practice in this field of medicine and a wide knowledge of the neuropathological problems so often encountered in today's stressed world. In this book he acquaints the general reader, in an easily understood and readable form, with the most frequent disorders of the nervous system and their treatment. Among them are insomnia, headache, sciatica and lumbago, certain trauma-induced diseases of the nervous system, infectious diseases (such as encephalitis, poliomyelitis, meningitis, etc.), disturbances of cerebral circulation (high pressure, stroke, etc), and several other disturbances of the nervous system. He examines the main causes of these diseases and gives advices on how to recognize the signs of such diseases in oneself. In a world where people look upon drugs as the universal cure for every ailment, and where drug abuse often leads to dangerous consequences, Professor Umansky reminds us of old, forgotten remedies that are both effective and harmless. He also gives advice on simple preventive measures. This book is intended for the general public.

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